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Clearing the Air

AT the time of the official inquiry regarding the erection of the new Fulham power station, just about two years ago, we expressed the view that the means of obviating the emission of fumes, grit, and sulphurous acid were, if not perfect, at least so far advanced as to warrant the belief that they would be made good enough to meet all reasonable requirements in the early future.

Justification for this confidence in the ability of our engineers and chemists to meet the conditions imposed by the official consent to the building of the station is now forthcoming. Last week the Electricity Commissioners reported that the Government Chemist had recommended the methods tried at Fulham as a solution of the sulphur problem. Now follows a report from a Committee set up by the Commissioners under the chairmanship of Mr. C. D. Taite to investigate means for overcoming the grit nuisance.

The broad conclusion of this Committee is that dust emission from power station chimneys can be prevented (even during soot blowing) by practicable means, with the reservation that such means may not in all cases be applicable to existing stations. The latter will include many relatively small stations where the problem is not acute (since emissions bear a close relationship to the output), and others for which the methods adopted are adequate to meet local requirements. In Germany, the authorities, who are notoriously keen on cleanliness, adopt a tolerant attitude towards the grit nuisance in industrial centres—possibly because it has not become a stunt of the daily Press.

The quantity and size of grit that can be sent into the air from pulverised-fuel installations is so much greater than where mechanical stokers are employed, that, as the Committee states, a solution in the former case is a solution for the whole. The electrical precipitation method emerges very well from the investigations and is recommended for pulverised fuel, but for stoker-firing, where gas velocity is high and the grade of coal low enough to justify any precautions at all, the somewhat cheaper multi-cyclone system should be quite suitable. Wet systems are not favoured. More frequent soot blowing than is customary in many cases is a practical point in operation that will no doubt receive due attention.

The recommendation that will cause most difficulty will be that relating to the increase in the height of chimneys requisite to discharge the gases into an air stream which will not come into contact with the earth under normal conditions. This cannot apply to the older stations and will make a big additional expense for the new, especially if a multiplicity of chimneys is called for, as the report implies. The object is to disperse particles of less than one-fiftieth of a millimetre in diameter, which form half of the flue dust.

It may be that this is an ideal to be aimed at and that local conditions will not always make it essential to give full effect to this particular suggestion by the Committee.

Lessons from Coal

THE development of the electrical and coal mining industries has much in common, and the address which Mr. W. B. Woodhouse delivered to the Batti-Wallahs last week indicated many of the ways in which we may learn from the long history of the largest industry in Britain. Two points he made were of especial importance. The first was that electricity is not essentially a rival of coal, but a method of using it in the most convenient form. Experience has shown that convenience promotes a higher standard of comfort, leading to the use of more electricity, and hence of coal. To charge more than the commercial minimum for coal supplied to electricity undertakings would assuredly be against the ultimate interests of the mines. The second point was that side by side with reductions in tariffs for electricity must go reductions in the cost of apparatus. The two aspects are interlinked, but reasonable tariffs come first; they

lead to increased purchases of appliances, which with increasing public demand can be produced more cheaply due to the rapidly lessening significance of development charges.

Parkinson Progress

THE speech at the annual meeting of Crompton-Parkinson, Ltd., which was read, in the regrettable absence of Mr. Frank Parkinson through indisposition, by Mr. E. C. Holroyde, the new director, contained a record of change and expansion which reflect the cool and calculating working of a mind which is looking well ahead. Rearrangements and reorganisations within the British electrical industry have been frequent during the last five or ten years, and there is nothing to indicate that the last chapter has yet been reached. What is happening under the Parkinson plan is " the continuous searching for new lines of manufacture to which the company's organisation is suited." In recent years the demand for electrical machinery has fallen, and, in some cases, almost completely ceased; in the present case, we are assured, the change-over has brought new sales which have more than offset these contractions.

Manufacturing Changes

LAMPS, transformers and cables were the main classes of product with which the speech dealt. The company has entered very energetically into the lamp business—it now controls the " Kye " lamp as well as the " Crompton "—and new factories have been built, including a glass works at Guiseley, while research and technical development have been provided for. The transformer developments have already been alluded to, and the policy is referred to on page 934 to-day; while the Derby Cable works is another recent acquisition. The looking-forward policy of the company is further illustrated by the attention which is being devoted to electric traction equipments—a coming department of the electrical industry which finds us all on the tip-toe of expectation and hope.

Wolf?

FOR many years it has been apparent that something would have to be done with the L.N.E.R. lines converging upon Liverpool Street Station, and for about the same number of years the directors have had an electrification scheme (or schemes) under their consideration. Unfortunately, for many reasons, they have been unable to proceed, and conditions at Liverpool Street, with the growth of population in the area which it serves, have become very bad indeed. Now what appears to be a new scheme has been prepared which, it is reported, will be put in hand when the London Passenger Transport Bill becomes law. If this is not merely a sop thrown to the clamouring citizens of Ilford and neighbouring towns it is good news not only for the long-suffering passengers, but also for the electrical industry.

On Tenterhooks

A SERIOUS obstacle to development in the past was the policy adopted by companies operating Provisional Orders on a limited tenure. In the development stages many of them lost money which they tried to make up later by confining their efforts to securing the cream of the load at the highest prices possible. These bad old times are recalled by the position in which the Sussex Electricity Supply Co. finds itself at Littlehampton. In 1922 it started the local supply under an inherently bad agreement with the U.D.C. to supply for ten years only, after which the Council had the right to terminate the franchise by six months' notice. The company realised in 1926 that it could not do its duty both to its shareholders and to its consumers, and since then has made repeated offers to the Council to reduce its terms for supply in exchange for an extension of tenure. These offers the Council has rejected, against the advice, we understand, of various consulting engineers. The Council apparently had no scheme for running the undertaking itself; failing that, one would have thought it would have driven, under expert advice, as hard a bargain with the company as possible. But no; it still wishes to keep the matter in the melting pot, and its only constructive proposal is to appeal to the Minister of Transport for a reduction in the charges. Possibly the Minister may reduce the maximum permissible, but that will not go anywhere near the root of the matter.

Electricity as an " Improvement "

AN old problem has again been raised at Linlithgow. Apparently for the last nine or ten years an addition of 5 per cent. has been made to the assessments of premises in that town in which electricity is installed, and the rating assessor has " got away with it." Now, however, the Town Council has decided to dispute the legality or equity of the imposition. The assessor seems to have got the idea from Edinburgh, where he himself had been subjected to similar treatment by the assessor in that city in respect of his own house. (How these assessors love one another!) This seems to be a pernicious form of tax which electricity should not be called upon to bear, although it has to be admitted that the substitution of electricity for other agents *is* an improvement. Arising out of this matter we may ask what happens to a consumer on a two-part tariff in which rateable value is a factor. When his assessment goes up on account of his electrical installation does he pay more for his electricity? The substitution of good drainage for bad does not raise an assessment. Why should the substitution of good lighting and heating for bad be thus penalised.

South African Prospects

CONDITIONS in South Africa, so far as electricity supply is concerned, are analogous to those in this country. While the industrial load has been adversely affected to some extent, the domestic branch of the supply business has continued to forge ahead. Again, as in this country, some measure of co-ordination and control of generation and distribution has been introduced under the auspices of an Electricity Supply Commission, although in this matter the analogy is not altogether a close one. In this issue our Johannesburg correspondent reviews recent developments in the sphere of domestic electrification, and shows that progress has been considerable during the last two or three years. In particular the demand for refrigerators is a large and increasing one, which, we are assured, on very good authority, is not having the attention paid to it which its importance merits. These facts should interest our electrical manufacturers in the market for the bulk of the electrical apparatus sold is imported, and conditions seem to be propitious for British traders. Our correspondent assures us that there is an atmosphere of good will towards British goods, and the exchange position and preferential duties are factors operating in our favour.

Chancel Lighting

WE do not always find ourselves in agreement with proposals on electrical matters made in the lay Press, but a suggestion in Mr. Arthur Mee's popular newspaper for children seems to us well worth consideration. It is that an automatic switch, operated by the insertion of sixpence in a slot, should be installed in every electrically lighted village church for illuminating the chancel for three minutes. In addition to giving pleasure to visitors and providing a revenue for the church, the plan would bring home to many people the ease with which electricity can be controlled for many purposes. The Editor of the paper referred to offers to pay for fixing the first equipment for lighting the chancel, installing the box, and to drop the first sixpence in the slot. Possibly others interested in the scheme would be willing to follow it up with regard to the second, third, and subsequent examples.

A LARGE WORKS CONVEYING SCHEME

TO the engineering mind the new factory at Beeston (Notts) of Boot's Pure Drug Co., Ltd., is notable for its extensive electrically driven conveying system, which embraces belt type conveyors only a few inches wide to slat equipments for packing cases, as well as numerous elevators for handling solid goods, and vacuum and compressed-air systems for the transmission of liquids.

The factory is practically wholly of concrete and glass construction. The main assembly hall is, at present, 580 ft. long and 69 ft. wide, excluding the assembly galleries on either side. Its equipment depends for its motive power upon numerous small electric motors. Lengthwise the hall is divided into four sections similarly equipped.

Considerable Speed Reductions

Each of a number of cross benches on the ground floor consists of two endless conveyors with separate direct geared motor drives. A top conveyor is devoted to packing materials, and the bottom one works in conjunction with various machines, *e.g.*, labelling, filling, capping, and cap-banding machines. On an average there are seven or eight motors on a line, mostly squirrel-cage machines arranged for direct starting by means of push-button equipment. The packing table drives have enormous reductions, the self-contained gearing alone is 100 to 1, and then there is a further reduction by sprocket to sprocket chain driving.

The top bench conveyors are gravity fed by chutes from overhanging platforms in commanding positions on the top floor level. Each chute serves several benches, and a girl at the feeding point has control of the distribution. There are gates at the entrances of the final sub chutes fed from a longitudinal conveyor served from the main chutes. Each gate is solenoid operated by a switch at the feeding point; in each of the final chutes there is a flap switch which is depressed by every parcel sliding over it. A time-lag relay connected with the switch guards against momentary operation on the flap. If, however, the flap remains depressed, as in the event of the line being blocked, the relay allows the switch to operate a signal light at the feeding point.

A general view of one section of the assembly hall showing the extensive conveyor and elevator equipment

Communication Between Floors

Each of about a dozen elevators on the opposite side of the floor will serve any gallery. Each elevator has its own drive, a ½-h.p. direct-on push-button controlled motor at the top of the structure. A gravity-operated brake serves each motor, and is held off during running by a solenoid. The operator on the ground floor switches on two signal lights, one at the foot of the elevator and one on the gallery to which she wishes to deliver goods, and also a hooter on the same gallery. A man acknowledges the signal by switching off the hooter, but leaves the lights on until he is prepared to accept the parcels.

Through a chute with a flap switch each elevator serves a longitudinal conveyor and, in turn, several cross conveyors, and the switching for these is so arranged that starting up can only be effected in the correct order. The motors for the elevators and allied conveyors are self-contained geared units, mostly supplied by Lancashire Dynamo & Crypto, Ltd., complete, and by the Power Plant Co., Ltd., with B.T.-H. motors.

Apart from its length, 1,200 ft. all round, the main feature of an endless conveyor from the finished stock to the dispatch departments is the very large overall reduction in the belt and gear 5-h.p. motor drive. It is arranged for direct-on starting, and there are many emergency stops. A slat conveyor for packing cases runs the full length of the first and ground floors, and by an ingenious switching scheme it operates in conjunction with empty and full case elevators, one at each end of the conveyor. The driving motor for each apparatus is supplied separately by three-phase 400 V, the common practice throughout the factory. But for starting there is a 230-V circuit controlled from a push button. This first energises a coil in one starter which, in turn, energises similar coils in the second and third starters. Each coil also operates its own switch independently. For this system there are about fifty emergency stops at different points.

Transporting Liquids

In a stock basement bulk storage is effected in sealed containers, many of stainless steel. Liquids are drawn into them by exhausting the air through the general service vacuum system, and they are discharged by reversing the process and displacing the liquids by compressed air. A 15-h.p. auto-transformer started motor serves the vacuum pump, and the compressor plant is situated in the near-by power station, in connection with which we described the supply exchange arrangements with the Derbyshire and Nottinghamshire Electric Power Co. in our issue of May 6th last. Liquids are also extensively conveyed by pumping, and compact motor-driven pumps may be seen in many parts of the works. A 10-h.p. B.T.-H. vertical motor with a float switch and an automatic star-delta controller is typical of a number of sump drives in connection with the works drainage.

There are some interesting group drives through laminated gears on to main shafts, a typical one being a 10-h.p. motor serving two lines of mixing pans and stirrers from a common shaft. In this case the shaft is near the floor because of the large headroom, but the common practice is to support the shaft from the ceiling.

There are four 2-ton, five 30-cwt., one passenger, and two service lifts, all supplied by Marryat & Scott, Ltd. Except

the service lift, they are all of the self-levelling type, a 30-cwt. lift having a 20-h.p. main motor surmounted by a 3-h.p. pony (levelling) motor. The motors were supplied by Crompton Parkinson, Ltd., and the switchgear by Dewhurst & Partners.

Electricity is put to good account in the laboratory, where we saw a 9.6-A Gallenkamp muffle furnace, a lamp specially designed for microscopic work, an ultra-violet ray lamp which is used in quantitative testing of drugs, an "Ellacold" automatic refrigerator, and incubators for "keeping" tests fitted with carbon lamps in bottom compartments. Apparatus for detecting arsenic content employs a copper-oxide rectifier (50 V, 3 A, a.c.) supplied by the Westinghouse Brake & Saxby Signal Co., Ltd. The drug to be tested is dissolved in sulphuric acid which is put into a porous pot. An anode surrounds the pot and a cathode is in it. The stream of hydrogen from the cathode, with any arsenic in the form of arsenated hydrogen, is carried out through a special tube packed with cotton wool soaked in lead acetate to purify the gas. The gas is forced through a special testing paper and deposition of arsenic is indicated by a circular stain.

There is a general system of interior lighting employing floodlight projectors supplied by the Credenda Conduits Co., Ltd., 70 ft. above the floor at 15 ft. 4 in. and 23 ft. centres. Industrial-type reflectors provide local lighting. Samples of various makes of lighting fittings were erected, and the makers were invited to check one another's photometer tests. Generally, five and six foot-candles are obtained at the working level. Some good examples of cube lighting were seen in cloak rooms, corridors, &c., including a special built-up fitting in the main entrance hall designed by the engineering department. The ground floor of one section of the main hall is the perfumery department, and it is covered in by a dome glass sub-ceiling. There is no separate general lighting system in this section, but the lighting is excellent and is "borrowed" through the glass ceiling from the general lighting referred to. A 150-line Ericsson automatic telephone board for internal communication is interconnected with a 400-line board at the company's Nottingham factory.

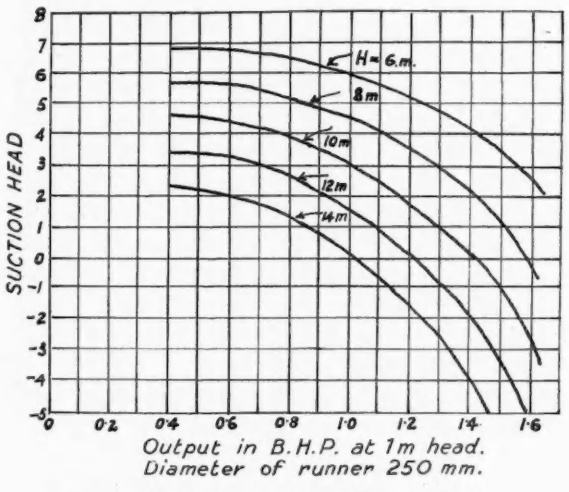
The factory throughout is equipped with "Synchromatic" clocks controlled from a master clock in the hall.

Blade Erosion. By F. J. Taylor

THE wasting away of the runner blades of hydraulic turbines in local patches was originally attributed mainly to erosion, and later to entangled air. The trouble has now been definitely traced to the water, which, by following only the contour of the blades at one particular velocity will promote air pockets and eddies which cause the blades to be alternately wet and dry when deviations from the critical velocity occur. The pressure on the lower side of the buckets is apt to fall to the evaporation limit and to bring about the condition known as cavitation.

The Nature of Cavitation

Cavitation was studied by the late Sir Chas. Parsons many years ago in connection with the erosion of high-speed ships' propellers, and was found to be caused by the formation of bubbles of water vapour when the absolute pressure drops to or below vapour pressure. This "cold boiling" can arise in hydraulic turbines, especially on the suction side of the runner, due either to too great a static suction head, to powerful dynamic action of the body of water, or to both. The dynamic action arises partly from the head required in the draft tube and partly from abrupt changes in direction of flow, the latter being due to faulty inlet angles of the runner blades, to excessively convex blade surfaces, and to insufficient rounding off of the outer band of the runner where the water passes into it from the guide ring. If cavitation or the formation of water vapour should occur at these points, the stream of water is separated from the surface of the blade, and the proper flow is disturbed; causing loss of efficiency and output.



Curves illustrating some Swedish experiments

Influence of Blade Shape

The setting up of negative pressure is only part of the effect, the actual pitting being primarily due to a mechanical action. True, the cavities are formed where the pressure drops below the vapour pressure, but when they are subsequently carried by the water into places where the pressure is higher, the vapour suddenly condenses and the cavities collapse. This causes a noise similar to that produced by steam when blown into cold water—termed condensation crackling. At hydraulic power stations this crackling may cause sufficient vibration to shake the building, and it is accompanied by intensive local water hammer which attacks the blades.

A turbine with several blades will have narrow water channels, and there will be a continuous decrease of pressure in the moving channel from inlet to outlet. The designer of high-speed turbines has aimed at avoiding narrow channels and materially reducing the total blade surface in order to reduce friction losses at high speeds, as for instance in the Kaplan turbine, which, owing to cavitation, may be unsuitable for high heads. Thus there arise two conflicting conditions: friction requiring small surfaces and cavitation to be avoided by the use of large surfaces.

By extending the blades, "channels" are again formed and thus the older wheel form is approached, the local vacua disappear, and the risk of cavitation is diminished, but there is a limit to the length of blade which can be conveniently used.

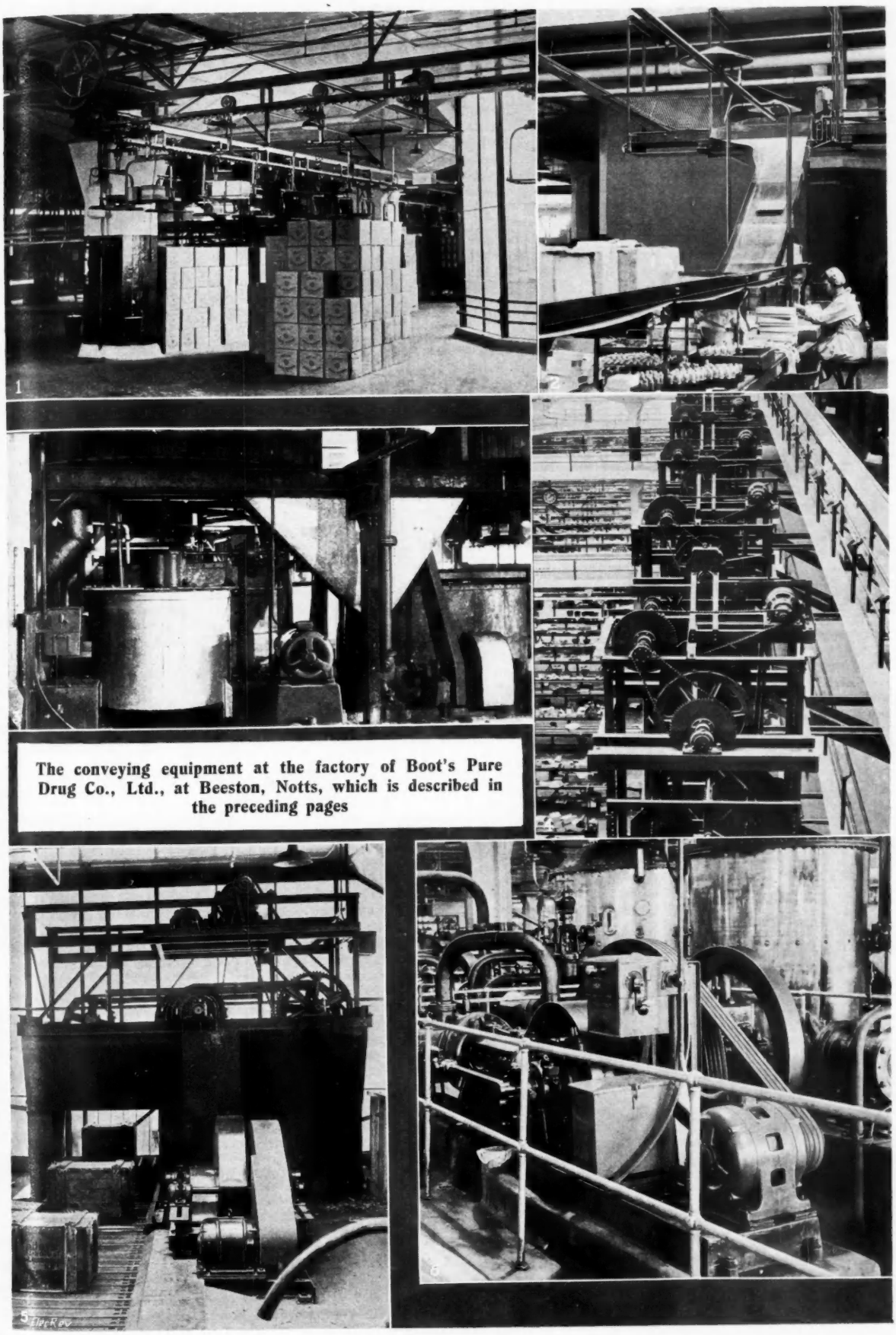
Cavitation will only produce erosion when accompanied by conditions which will cause the cavities to collapse in such a way and in such a position that the energy of the collapse is concentrated on a small proportion of the blade surface. The first visible sign of cavitation in turbines is that some spots on the blades assume a silvery surface which seems to arise from water hammer, and these spots at later inspections have shown the worst effects of erosion.

Remedying the Evil

Investigations by Elov. Englesson have shown the superiority of cast steel with a high chromium content for turbine blading. Pitting can be avoided to some extent by limiting the suction head, and the greater the head the lower the suction head must be in order that the cavitation limit shall not be exceeded; also the higher the specific speed the lower the suction head should be. High specific speeds and, with Kaplan turbines, relatively high heads, are now demanded, so that the turbine builder is compelled to design machines running dangerously near the cavitation limit; for this reason a resistant material is desirable for the blades.

The greater the velocity head regained in the suction pipe the greater will be the reduction in pressure on the back of the blades, which must be counteracted by an amply dimensioned runner. High speed runners, in order to reduce friction, are given a short blade length as compared with the pitch, but this again leads to a greater specific pressure on the blades which increases the risk of cavitation. The greater the head and the suction head the longer must be the blades, and the lower in consequence is the specific speed. The greater length of blade used up to the present for Kaplan-type turbines has not much exceeded the pitch; the only objection to the use of overlapping blades is that more than four would be required, which would be objectionable with a movable blade system. Propeller type turbines having fixed blades to the number of six or eight can be designed with considerable overlap at moderate specific speeds and are therefore suited to somewhat higher heads.

Cavitation depends upon several other factors, *e.g.*, the shape of the blade, the peripheral speed of the runner and water temperature. The influence of these factors may be estimated approximately, but the suction head permissible for different types of blade must be determined experimentally. The curves show results of experiments carried out at the laboratory at Verkstaden, Kristenhamn.



The conveying equipment at the factory of Boot's Pure Drug Co., Ltd., at Beeston, Notts, which is described in the preceding pages

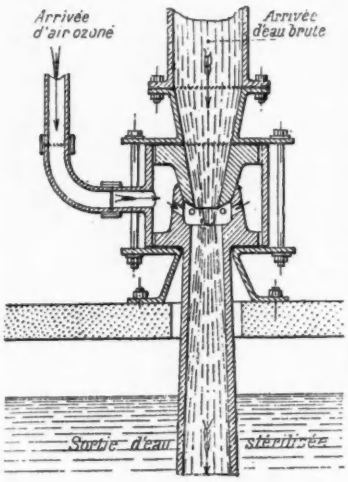
1. Driving end of a conveyor serving stock and despatch departments. 2. A chute serving an assembly conveyor, showing flap switch and solenoid-controlled gate. 3. A combined mash tun and spent-grain pump drive. 4. Tops of a line of assembly room elevators, showing small brake-controlled motors. 5. Propelling equipments for case conveyor and case elevator. 6. An electrically driven vacuum pump for liquid transmission

Electrical Water Sterilisation. By T. Rich, M.I.E.E.

French experience with electrically produced ozone

ELECTRICALLY produced ozone has not been used to any material extent in Great Britain or in the British Empire for the sterilisation of water for the supply to towns and villages. In France rapid progress has been made with the system which is very simple. Fresh air is drawn through a high-frequency ozone generator, and then intimately mixed with the water to be purified in a special form of injector; the excess ozone is discharged by passing the water over a series of weirs. The water is then potable, the microbes having been burnt up by the ultra-active oxygen.

The system is being developed also in the French colonies, where under tropical conditions the purity of a water supply is a matter of supreme importance; it is being used also for the supply of potable water to factories and power stations. A modified form of apparatus has been developed for use in private houses and farms which are within the reach of electricity supply mains.



The Otto emulsifier

The power consumption per thousand gallons treated is very low, yet as millions of gallons are used per day the load is quite appreciable and could be supplied mainly at off-peak times. The plant is very simple and such facilities in a number of cases might well tend to turn the scale in favour of electric pumping for water supply work as against a steam or oil engine drive.

Rural Applications

In England chlorine is used somewhat extensively for water purification; and the water is sometimes distinctly disagreeable. At one time iron filings in a revolving drum were used for the oxidation of bacteria in water, and the art of rapid sand filtration has also made great progress; but now that rapid inexpensive sterilisation is available on various systems it seems absurd to incur the very heavy expense or inconvenience of buying up or obtaining control of water catchment areas when, with electrical methods yellow, and even smelly water can be made wholesome.

Automatic water ozonisers have now been developed for use in country houses, farms, and even villages, which come into action directly the water is turned on. If the electricity supply goes off the water supply is automatically cut off, so that microbe-infected water cannot be obtained for culinary and other purposes from the sterilised water tap. The ease with which water can be sterilised is one of the many advantages that a rural electricity supply can carry with it.

In an article on the purification of water by ozone which appeared in the *Bulletin d'Information et de Propaganda* of Paris, Mr. F. Sentis (engineer, French Ouest-Lumière Power Co.), states that ozone or polymerised oxygen (O_3) being an unstable gas cannot be produced in the pure state; it is always diluted with a large quantity of air or oxygen, and its chemical preparation is practically impossible. It can, however, be produced industrially by passing air through electrical discharges. Owing to its instability the gas has to be produced on the spot at the moment when it is to be utilised.

The Generation of Ozone

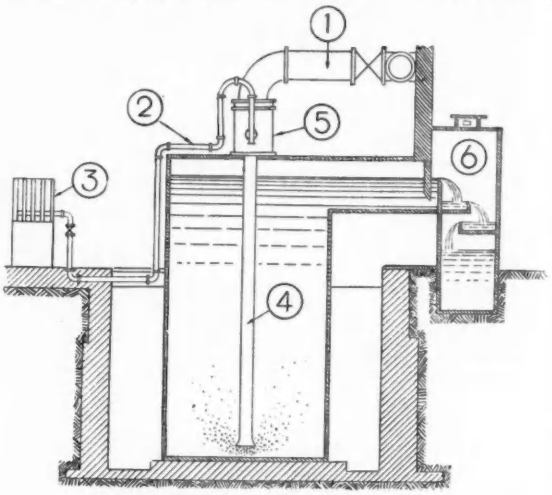
An ozone generator is a very simple contrivance. Two plates are placed parallel with one another a few millimetres apart, separated by means of two dielectric sheets which prevent the creation of sparks, and a high-voltage high-frequency current is produced which by a discharge ozonises the air. To obtain perfect water sterilisation intimate contact must be made for a few moments between the water and the ozonised air. Ordinary mixers cannot be used, as the oxidising properties of ozone are such that metals are rapidly attacked. Mr. M. P. Otto has designed an emulsifier based upon the injector principle, in which the jet and mixing column are made of earthenware. After leaving the column the water flows over cascades to get rid of the excess of gas. An elevated cylindrical tank filled with water is used to discharge cooling water over the plates. As the h.v. plates must be insulated, the cylinders, with the broken up globules of the flowing water, must also be insulated.

A large proportion of the installations in operation deal with water of a type which may contain an enormous number of microbes. The pumping station at Saint-Maur, outside Paris, uses the impure waters of the Marne. Water of an accentuated blue colour is turned to an azure blue colour, the microbes being definitely destroyed by being burnt up by the action of the ozone, although the water is not heated by the process. The action is so strong that it is accompanied by a striking phosphorescence.

Extent of Use

The number of water supply installations using ozone is rapidly increasing in France. In 1920 there were twenty installations supplying 210,000 cubic metres (46 million gallons) per day for 300,000 inhabitants. In 1930 there were fifty-four installations with an output of 350,000 cubic metres (nearly 80 million gallons) per day for 700,000 inhabitants, not counting the Saint-Maur installation, which supplies water to a large part of Paris.

The consumption of power for sterilisation is very low, being about 0.0125 kWh per cubic metre *i.e.*, 18,000 galls. per kWh. The low operating cost is one reason for the rapid development of the system; another is the efficiency of the purification. Small-scale apparatus has been developed on the same system by the Compagnie des Eaux et de l'Ozone of Paris.



The arrangement of a sterilising plant

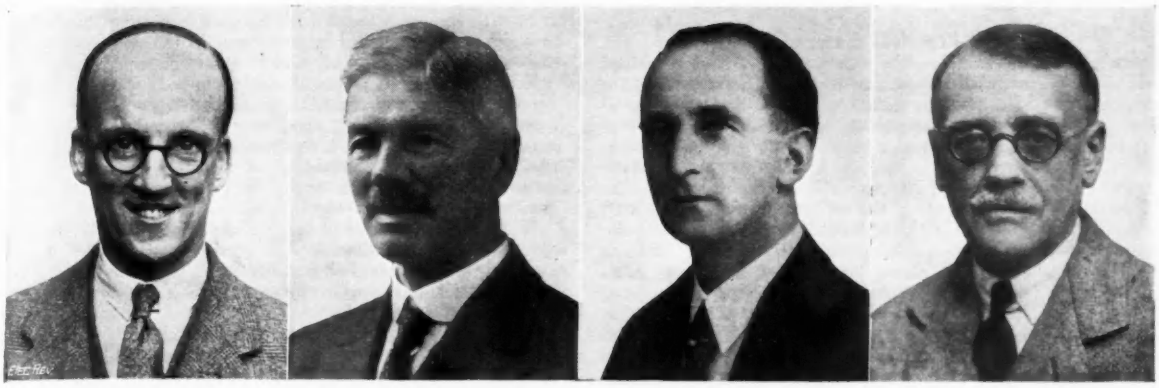
1, Inlet pipe for raw water under pressure; 2, Ozonised air inlet pipe made of stoneware; 3, Battery of ozone generating plates; 4, Mixing column; 5, Injector-emulsifier; 6, Weirs for the desaturation of the water.

An Electrically Driven Ice-breaker

THE ice-breaker *Ymer* now under construction at Malmo for the Swedish naval authorities, is a notable example of electric propulsion. Power will be obtained from six 1,050-kW 440-V d.c. generators driven by M.A.N. Diesel engines running at 325 r.p.m. In addition there will be two 300-kW 230-V d.c. generators, for supplying the auxiliaries and excitation, and one 50-kW 230-V d.c. generator for the skeleton auxiliaries in port. Excitation for the propulsion generators will be obtained from four motor generators, one of which will act as a standby. The total power required for propulsion is 8,100 s.h.p. on three propellers, two at the after end and one at the forward end, driven by three 2,700-b.h.p. tandem-armature motors running at 140 r.p.m., the propeller speed at full power. Both the after propeller motors will be shunt wound, but the forward motor will be series wound. The direction and speed of the propeller motors will be controlled on the Ward-Leonard system from five positions, four on deck and one in the engine room. The vessel will be merely a hull packed with machinery and it will be the highest powered Diesel-electric ship in the world.

For ice-breakers the operating conditions are severe and quite special; frequent and rapid manœuvring is required and bridge control is a decided advantage, as there is no loss of time between giving the signal and carrying out instructions. Continual reversals of Diesel engines are not desirable, particularly under ice-breaking conditions, and the electric drive is the logical scheme for such craft. Another ice-breaker now being built at Amsterdam will be equipped with a Diesel-electric drive, and the Soviet is considering the construction of a vessel similar to the *Ymer*.

Some Municipal Electrical Engineers



From left to right: Mr. W. N. C. Clinch, Brighton; Mr. J. K. Brydges (*Weston & Son*), Eastbourne; Mr. F. Swarbrick, Hove; and Mr. C. A. Frost (*Cooke*), Bexhill

The Measurement of Noise. By G. W. Stubbings, B.Sc.

A guide to remedial measures

BY developing mechanism engineers tend to increase noise production. The prevention of this nuisance thus falls within their scope, but the quantitative investigation of the subject is only just beginning to engage their attention. The measurement of the subjective effects of sound has been worked out in great detail by telephone engineers. The quantitative aspect of noise is closely connected with that of sounds which constitute speech.

Noises may not be inherently unpleasant; but, owing to their persistent duration, or to the circumstances in which they occur, they may cause definite aural discomfort. The actual sounds which constitute noise may, then, be composed partly of sounds of definite musical pitch, as well as of noises which have no definite frequency. Sounds set up by electrical machinery and transformers consist almost entirely of definite musical notes, while those caused by the compressed air drills used in modern road repair work are composed almost entirely of unpitched sounds. A given increase in sensation is always produced by the same fractional increase of the stimulus. The stimulus is measured by the momentum of the sound wave, or the atmospheric pressure which this wave exerts upon a fixed diaphragm. The fractional increase of stimulus required to produce a given increase in sensation is not independent of the frequency or pitch, and this circumstance gives rise to a difficulty in measurement.

There is a close analogy between the sensation of loudness and that of pitch. An increase in pitch of one octave is always brought about by a doubling of the frequency of the sound vibration. Similarly, the other musical intervals, representing augmentation or diminution of pitch, are associated with definite frequency ratios which are themselves independent of the absolute pitch. If, for instance, the frequency of a vibration is increased by one half, the pitch of the musical note will be increased by an interval which the ear recognises as being constant. Ranges of musical pitch are reckoned in octaves, and this is evidently equivalent to the difference of the logarithms of the frequencies, the base 2 being used for the logarithm.

The Units Adopted

The customary unit of acoustic pressure is the dyne per sq. cm., and it is known as the "bar." The instrument used for the determination of sound pressures is the microphone, and the voltage produced therein by an incident sound wave is proportional to the sound pressure. The energy in a sound wave is proportional to the square of the amplitude, or to the square of the pressure, and it is interesting to note that, contrary to what might be expected, acoustic energy is not the physical basis of subjective sensation.

As a variation of the sensation produced by sound depends upon the ratio of acoustic pressures, it follows that a constant increase in sensation will be produced when the logarithm of the ratio of the sound pressures is constant. The unit used in quantitative statements of loudness is the decibel, which is defined as being equal to twenty times the logarithm to the base 10 of the ratio of the actual acoustic pressure of the sound being measured to the pressure of the smallest sound which is audible.

This reference pressure, which represents the lower limit of audibility, is usually taken as equal to 0.01 bar. A loudness of 20 decibels means that the logarithm of the ratio of the sound pressure being measured is unity with respect to the reference pressure. The actual ratio of the pressures is thus 10, since this number is the base of the logarithmic ratio. A loudness of 40 decibels, giving a logarithmic ratio of two, corresponds to an actual ratio of 100. The sensation of loudness differs in a very marked manner from that of pitch, in that quantitative estimates of loudness cannot be made by the ear with any degree of accuracy, whereas differences of pitch, especially of an octave, can be estimated subjectively with great precision. Loudness must therefore be measured indirectly, by an instrument which is responsive to acoustic pressure.

Noise Meters and Auxiliaries

Noise meters comprise a sensitive microphone, with an amplifying arrangement which delivers current to a rectifier type of milliammeter. The microphone is designed to have a resonant frequency well below that of the sounds to be measured, so that the voltage which it generates, and, ultimately, the current delivered into the milliammeter circuit, will be proportional to the acoustic pressure. The instrument can be calibrated in terms of pressure, in which case a full scale reading for 0.1 dyne per sq. cm. can be obtained, the range being extended to 200 dynes by means of attenuating circuits. The instrument is calibrated with a standard tone having a frequency of 1,000 cycles per second, this note being musically nearly the same as C in alt. If desired, the instrument can be scaled logarithmically in decibels, the maximum range then being 66 decibels with respect to a reference pressure of 0.01 dynes. The figure 66 is twenty times 3.3, which is the logarithm of 2,000, the ratio of the maximum pressure to the reference pressure.

Such an instrument would be perfectly suitable for the measurement of pure tones of the frequency at which the calibration was carried out. There are, however, two circumstances for which correction is required if the instrument is to be used for the measurement of sounds of indefinite pitch. First, as noted above, the fractional increase of acoustic pressure required to produce a given increase in sensation varies with the frequency.

Or to express this in other words, the decibel (as a measure of loudness) is not independent of the frequency. Further, with a constant acoustic pressure the sensation of loudness varies to some extent with the frequency. The extent of this variation will be realised when it is stated that between frequencies of 60 and 2,500 the pressure of a tone of equal loudness varies from 4 to 0.2 bars, the lower frequency requiring the greater pressure to produce the given sensation. Equal loudness curves vary in shape with the given degree of loudness specified, but in correcting a sound meter for this variation of pressure with frequency the curve for the figures referred to is taken as the standard.

The correcting device in the sound meter consists of an electrical circuit so adjusted that the reading of the milliammeter for a given sound pressure varies with the frequency, the extent of the variation being such that equal readings of the instrument are obtained at frequencies of 60 and 2,500 with sound pressures which vary in the ratio of 4 to 0.2. An instrument designed in this way will measure total noise according to a rational convention. If desired, the corrective network can be switched out of circuit. Sound meters can also be designed to analyse a complex sound into its various components. Such meters comprise a frequency-analyser circuit, whereby the response of the indicating instrument is confined to sounds of one particular frequency. The responding fre-

quency can be varied in precisely the same manner as a radio receiving set is tuned.

A Practical Example

An interesting article in a recent issue of *Power* described tests carried out with a machine consisting of two turbines driving a d.c. generator by means of double herring-bone reduction gearing. By a comparison of the frequencies of the components of the total sound with those of the pinion rotation and tooth contact it was possible to locate with precision the parts of the machine which gave rise to the separate components. When the results of the analysis were plotted a kind of sound spectrum was obtained which exhibited not only the frequencies but also the magnitudes of the various harmonic components of the total noise. The sounds of definite pitch which were detected by the frequency analyser did not, of course, constitute the whole of the total sound, as a proportion of it was noise of no definite pitch caused by knocking and grinding.

The magnitude of the unpitched sounds is found in the difference between the total noise and the sum of the harmonic (pitched) components. None of the components of definite frequency corresponded to any tooth contact frequency, or to any multiple, which important result indicated that the form of the tooth profiles was very accurate. The machine was opened up and certain adjustments were carried out in accordance with the indications of the acoustic measurements, which brought about a decided improvement in the operation of the machine from the point of view of quiet running.

It now appears to be practicable to embody in specifications definite requirements regarding the maximum permissible noise a machine should make when running normally. The total noise, maximum harmonic component, combined musical note, the unpitched sound made by a running machine can be determined with a high degree of precision with the sound measuring instruments now available.

In conclusion, it must be stressed that the quantitative statement of noise is in terms of a physical magnitude (sound pressure) to which physiological sensation is presumed to bear a definite functional relation. This method is the only one now possible, but it must be remembered that the circumstance that sound measurements are indirect places them in a different category from that of musical pitch and light intensity measurements, in which physiological sensation can be obtained with much greater accuracy, as null methods can be employed with which the human ear or eye is able to detect very small differences between the effect being measured and a determinate standard.

Power Factor Correction

The B.T.-H. shunt phase advancer in a brick works

THE shunt excited phase advancer has been developed to provide the same characteristics as the B.T.-H. "No-lag" motor, but for large outputs, high voltage supplies, and for existing induction motors.

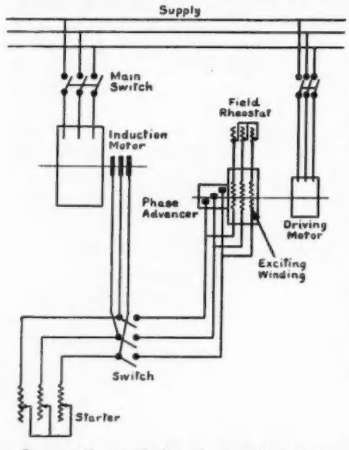
The phase advancer illustrated has been installed at the works of a well-known English brick company to improve the power factor of an existing induction motor and is rated at 300 A, 13 V, 6.8 kVA, 1,450 r.p.m. It is driven by a small squirrel-cage motor, started by means of a push button operating a contactor.

The main motor is started by means of a liquid starter and when it is up to speed the phase advancer is connected into the rotor circuit by first closing a three-pole switch and afterwards open circuiting the starter.

Easy Installation

The existing gear was not disturbed during installation, as the extra cables were connected to the terminals of the starter. The additional control cubicle, containing the field rheostat, change-over switch, and contactor, is shown to the left of the main stator switch cubicle. The equipment is fully interlocked.

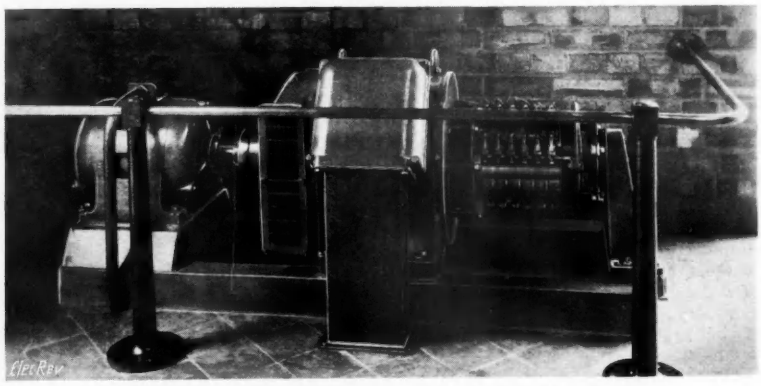
The action of the shunt phase advancer is similar to that of the shunt excited d.c. exciter used with a synchronous motor, except that it supplies a low-frequency a.c. voltage instead of a d.c. voltage. The power factor of the motor can be adjusted by a shunt field rheostat in the same way as that of a synchronous motor. If the full amount of power factor correction is not required, the rheostat can be adjusted to obtain maximum efficiency without interfering with the pull-out torque or other characteristics of the motor.



Connections of the phase advancer

The existing 250-h.p., 488-r.p.m. motor, was originally installed to replace a steam engine driving a battery of brick presses. The actual load was about 190 h.p., and the power factor was only 0.72 lagging. At this reduced load the power factor of the motor was corrected to 0.95 leading without increasing the rotor current above its normal full-load value, and the phase advancer, rated at only 6.8 kVA, relieves the system of about 200 wattless kVA.

The improved power factor has reduced the bill for electricity by £46 a month, but a reduction in overall efficiency of about 2 per cent. costs £4 a month, and the net monthly saving is £42. The cost of the complete equipment, about £180, was thus paid off in a period of only just over four months.



A B.T.-H. shunt phase advancer installed at a brick works

Favourable Comparisons

For power consumers who have a slip-ring induction motor of 100 h.p. or over, running at constant speed, the installation of a phase advancer is regarded as the cheapest method of obtaining power factor correction. The correction obtainable depends on the permissible rotor current. If the motor is fully loaded the power factor can usually be raised to unity without increasing the temperature rise; if it is underloaded considerably more correction can be obtained.

It is claimed that for a new installation an induction motor with shunt phase advancer compares favourably with other methods of obtaining a large starting torque together with high running power factor, particularly when unity or a slightly leading power factor is sufficient. In comparison with the synchronous induction motor such a set generally has much to recommend it from the point of view of initial cost and efficiency if unity power factor is required. It has also the advantage that the characteristics (pull-out torque, starting current, &c.), are the same as those of a normal slip-ring induction motor.

The B.T.-H. Co. has recently obtained the order for a 1,100-h.p. induction motor with shunt phase advancer for the new flour mill at Cardiff of Messrs. Spillers & Bakers, Ltd. The consultants were Messrs. Sloan & Lloyd Barnes, Liverpool. A synchronous induction motor was specified in the first instance, but this was changed to an induction motor with phase advancer on account of the higher efficiency of the latter and its ability to run without the exciter as an induction motor in emergency. The lower value and higher power factor of the starting current were also important factors in arriving at a decision.

An Egyptian Scheme

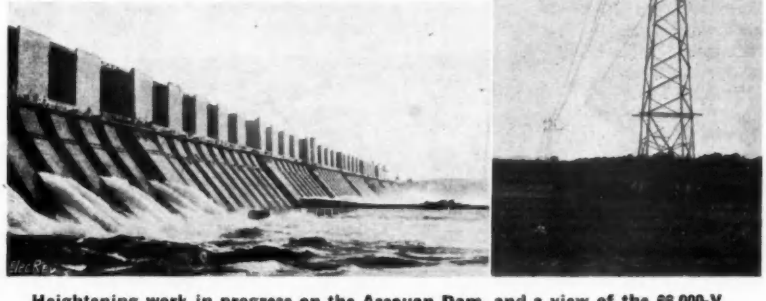
Transmission equipment for electrical irrigation

IN 1931 the Egyptian Government decided upon a complete electrification of the series of fertile areas in Upper Egypt on the banks of the River Nile, known as the "Isolated Basins." The scheme comprises a number of electrically driven pumping stations supplied with power from a generating station at Idfu by means of overhead transmission lines, and, in conjunction with the heightened Assouan Dam, will enable the land to be irrigated and drained in a modern and efficient manner.

Tenders were open to world competition, and a contract for the supply and erection of the necessary overhead transmission system, together with four transforming stations and one sectionalising switch station, was awarded to the General Electric Co., Ltd. At first the transmission system will operate at 33,000 V three-phase, but the pressure will later be raised to 66,000 V, and all the equipment has therefore been designed to be suitable for the latter voltage.

The overhead lines are single-circuit three-phase, three-stranded copper conductors, each having a cross-sectional area of 50 sq. mm., and an over-running galvanised steel earth wire is carried on self-supporting lattice steel towers. The insulator strings are composed of spring ring ball-and-socket type insulator discs. The normal span is 200 metres, and the total length of the lines is approximately 115 km. In addition there are two overhead Nile crossings, one being a double circuit with a span of 690 metres, and the other a single circuit with a span of 720 metres. The lattice steel crossing towers are of the terminal type, 93 metres high, and provide a minimum clearance of 50 metres between the conductors and the river at high-water level.

The four transforming stations each consist of an outdoor switch structure and a transformer house. Each outdoor structure carries one triple-pole rotary air-break 300-A isolating switch and one three-phase 1,500,000-kVA oil circuit breaker, which connect the incoming lines to busbars. In addition there are two triple-pole rotary air-break isolating switches with earthing links between the busbars and the power transformers. Each transformer house contains two 535-kVA, 66,000/33,000/3,300-V oil-immersed transformers, and also lighting transformers and the necessary low-voltage switchgear mounted in totally enclosed steel plate cubicles. At the switch station two air-break isolating switches and one oil circuit breaker are provided. In addition to the overhead transmission system there are four three-core 3,300-V submarine cables crossing the River Nile.



Heightening work in progress on the Assouan Dam, and a view of the 66,000-V transmission line

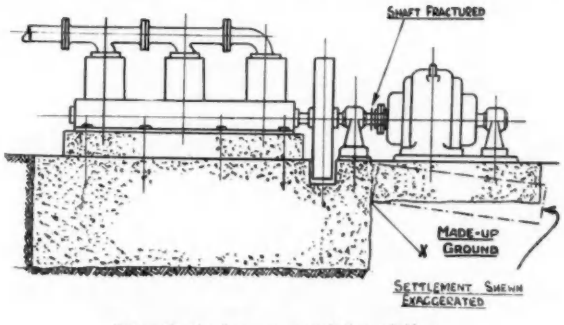
The overhead lines and transforming stations are already completed. The power station and the pumping stations will be finished in 1933.

The Misalignment of Plant

ONE of the most frequent causes of the misalignment of plant is the unequal settlement of its foundation, and the evil is accentuated through the eagerness of the erector to avoid a penalty for late completion of the installation. In fairness to the erector, it should be expressly stipulated that the final alignment of all plant installed upon new foundations should not be undertaken until after the substratum has been allowed to assume a final set. This cannot happen until the total weight, comprising that of the whole of the plant and its foundation, has been allowed to rest upon the sub-soil for some time, the extent of which is entirely dependent upon the substance forming the substratum.

Misplaced Blame

Even the very best of erectors have sometimes been blamed for subsequent trouble that has been attributed to carelessness in aligning the plant, and it has been difficult to blame inattention to the details appertaining directly to the foundation. Sometimes in an endeavour to cut the cost of the material forming the foundation of machinery and plant, varying depths of concrete are utilised in the same common block.



The effect of an unequal foundation

This procedure might be satisfactory in cases where the plant is light and the loads are not likely to be severe, but for such units as oil engines, direct-coupled to electrical machinery upon one common concrete block, the practice is definitely dangerous.

Any plant which is dependent upon the perfect alignment of one or more continuous shafts erected upon a common block of concrete must have equal depths throughout the foundations without any abrupt sectional changes, irrespective of the weight of the various parts; the maximum depth of the concrete block should be calculated from the heaviest portion of the plant.

The accompanying figure illustrating a generator direct-coupled to an oil engine, which gave trouble on account of a fractured shaft, provides an example of the danger attending the practice of varying the foundation depths. The engine portion of the foundation was considerably deeper than that of the generator, on account of the difference between the weights of each unit. After some little time the foundation block sheared at point X, thus allowing the generator to settle at the extreme end. Whilst the settlement must have been gradually developing before the final fracture of the block and shaft, investigations afterwards proved that the portion of the sub-soil directly under the generator was made-up ground which would have ensured a bed of good sub-soil if the same depth had been excavated as had been from under the engine.

The plant was consequently dismantled and a new portion of concrete laid at a depth equal to that of the engine portion. For the purpose of ensuring a firm bond between the old and new concrete, dovetails were cut vertically in the old block, and the plant has now been in commission for close on two years without further trouble on account of misalignment having been experienced.

Preventing the Abrasion of Bearings

Rapid wear of bearings has been found in several instances to be due to the dusting of concrete floors adjacent to the plant. The constant passage over such floors causes minute particles of abrasive matter to find their way to the journals of shafts if they are not adequately protected. Disintegration of concrete foundations through the constant percolation of oil also causes settlement, and, whilst oil save-alls should be fitted in every convenient instance, an excellent remedy for preserving concrete surfaces from the effects of oil or dusting is a liberal application of silicate of soda.—E. L. PARRY.

Domestic Progress in South Africa.

By OUR JOHANNESBURG CORRESPONDENT

Good prospects for British manufacturers

PROGRESSIVE domestic electrical development is in evidence throughout this country. In many respects this development has been of a spectacular nature, but it is easily understood when we see that the introduction of attractive tariffs and reliable and cheap appliances are of comparatively recent introduction. The ever-watchful eye of the Electricity Supply Commission, which has "fathered" many schemes here and has given useful and disinterested advice in others, is always anxious to see that the interests of the consumers are studied.

The constitution of the Commission, which, unquestionably should have been of a more arbitrary nature, is such that it cannot always bring some of our recalcitrant councillors to acknowledge the existence of the economic factor in the business of power supply. The result is that their eyes are often closed to the advantages of a bulk supply at low rates. Strictly from a business point of view this is to be regretted, as the Commission with its able advisers, is in a position to offer impartial advice in the best interests of both supplier and consumer. However, despite these internal "bickerings," electrical development is very satisfactory. That the market for domestic appliances offers considerable possibilities will be seen from the figures mentioned later. These possibilities are not confined to smaller articles such as kettles and irons, heaters, and so on, but are equally prominent in respect of ranges, refrigerators and latterly water heaters or geysers.

One of the showrooms of the Cape Town municipal electricity undertaking, in which a good variety of appliances (most of them obtainable by "easy payments") is exhibited

On the question of water heating, one must remark upon the dilatory methods with which this branch of domestic business has been tackled. This is no doubt due to electric water heating being a comparatively recent innovation and to the fact that many municipal undertakings objected to the general running of water heaters at the time of peak loads. The tendency now is to confine water heating, at special low rates, to "off-peak" hours, and this method is working admirably. There are some towns which do not seem to exert any effort in fostering the adoption of electric water heating, but later on these will find out that judicious development in this respect will do much in improving their undertakings' load factor.

Results in the Principal Centres

In Durban, which, as is generally known, occupies a prominent place in domestic electricity, we find that this year, down to the date of writing, 1,206 ranges have been installed, corresponding with 1,412 last year, and 530 water heaters have been added to the mains, corresponding with 700 in 1931. The number of refrigerators totals 814 and 445 respectively for the period, which is an increase of nearly 83 per cent. Durban now has 9,767 electric stoves, 5,939 electric water heaters, and 2,068 refrigerators connected to the mains.
2,068 refrigerators connected to the mains and the rate of progress continues.

In Cape Town, prior to the introduction of hire-purchase facilities, there were only 1,050 electric ranges in use in the area of supply, but within two years of the inauguration of the hire-purchase system there were no fewer than 4,247 ranges connected up, and the rate of new connections of these and other appliances purchased under the Council's easy-payment plan shows no sign of falling off, notwithstanding the prevailing trade depression. Under the hire-purchase facilities Cape Town during the past two years has installed 3,197 ranges (each of not less than 3,500-W loading), 367 refrigerators, 154 water heaters (60-gallon capacity), 58 washers and ironers, and 407 kettles and irons, with a total retail value of £121,240, and representing a total connected load of 22,571 kW. Furthermore, the installation of these appliances and the cost of the necessary materials and control apparatus, brought the total involved to £151,414.

In Johannesburg, the position is no less satisfactory and suitable tariffs, together with a deferred-payment scheme, have been responsible for 1,914 ranges being placed on the mains since July, 1930—781 in 1930-31 and 1,133 in 1931-2. In Pretoria the total number of electric stoves now connected to the mains is 1,800, while water heaters number 412. In Port Elizabeth, according to recent reports, there are at the present time just over 900 electric ranges, and approximately 220 refrigerators connected to the municipal council's distribution system.

Whilst these results may at first glance appear very satisfactory and, in fact, are so, the tariffs now in force justify the Department's anticipation that these figures, with the assistance afforded by hire-purchase facilities, will be considerably increased when the scheme is satisfactorily functioning.

Ample Scope

There are numerous other towns which have shown equally satisfactory, if proportionately smaller, progress in this respect, but the possibilities will be appreciated when it is realised that the figures quoted touch but an infinitesimal part of what it is hoped to accomplish in the future. Electricity is making a stronger appeal to the housewife every day, and the tariffs now in force or contemplated, will, it is expected, achieve very considerable results. Apart from the advantages of electricity in the home, undertakings realise the importance of the cumulative effect on the load of electrical appliances, whether small or large.

British manufacturers, I believe, are getting a big share of the trade in these appliances. German, Canadian and American firms are well represented, but the exchange disparity to-day is in favour of British firms. In any case "Buy British" is a popular slogan in this country, despite our politics, and manufacturers in England ought to profit accordingly.

Johannesburg's New Railway Station

THE electric sub-station of the new railway station at Johannesburg contains 2,200-V switchgear and transformers for stepping down to 380/220-V with low-voltage switchgear controlling all supplies to the building and automatic signals. All cooking appliances in the kitchen and elsewhere are electrically operated. The eighty clocks are electrically controlled from a master clock. The hot water for heating the building is circulated by electrically driven pumps, and the ticket printing room in the east basement has an electrically driven plant. The central portion of the main hall is indirectly lighted, the projectors being concealed and their light directed at the white domed roof. Large modern fittings, suspended from the centres of vaulted domes, and designed to harmonise with the architecture, supply most of the light required on either side of the centre. In the marble panelled dining-room three richly ornamented candelabra in the middle of the room are the chief sources of light, which is supplemental to candle brackets mounted on mirrored panels. The lighting elsewhere is also well done. By the time the work is completed, 30,000 ft. of power cable, 85,000 ft. of galvanised conduit, 270 miles of insulated wires (excluding those for telephones), 5,300 electric lamps, 3,380 electric lighting fittings, 270 signal relays, and 75 point machines will have been installed.

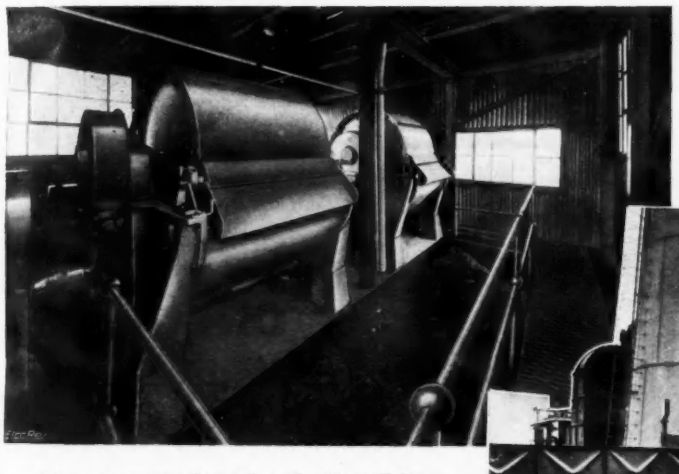
The Reduction of Chimney Emissions

Report of the committee appointed by the Electricity Commissioners

IN June, 1930, the Electricity Commissioners appointed a Technical Committee to consider the measures taken in this and other countries to prevent the emission of soot, ash and grit from the chimneys of electric power stations. The report of this committee has now been published (Stationery Office, 5s.). A sub-committee visited fourteen power stations at home, fourteen in Germany, and three in France which have adopted methods for dealing with emissions. It also took evidence from numerous experts, British and foreign.

In 46 per cent. of 111 British "selected" stations no grit-extraction plant has been installed; in 48 per cent. the cyclone type has been adopted. Pulverised fuel is in use in only 14 per cent. of these stations, but 81 per cent. of these have grit extractors. In Germany, where the power stations are generally larger than in this country, electrostatic precipitation coupled with high chimneys is strongly favoured.

The concentration of grit in flue gases is governed by: (1) the method and rate of combustion; (2) the design of boiler and flues; (3) the ash content and its nature; and (4) the combustion characteristics and size of the fuel as fired. Concentration is at a minimum when stoker plant is used with fuel of low ash content. A stoker-fired plant burning a fuel with 12 per cent. ash content might pass 10 per cent. of the ash to the chimney (0.3 gr. per cu. ft.), but a pulverised-fuel plant might pass 70 per cent. (2.62 gr. per cu. ft.). Some portion of the grit is attributable to mineral matter in the fuel.



Filters for separating ash and grit particles

Comments on Grading

The sub-committee regards grading by sieves as unsatisfactory, as it is unreliable below 200 mesh (63 microns) (Institution of Mining and Metallurgy standard), and impossible below 325 mesh. Also, the specific gravity of the particles is more important than their diameter. The air elutriator is considered to be more satisfactory. The micron (one-thousandth of a millimetre) is unsuitable as a standard, and some unit should be evolved by which the grading of dust can be expressed by its rate of fall in still air. Particles below 20 microns (which form about 50 per cent. of flue dust) if discharged into an upward or horizontal air stream will be sufficiently diffused to avoid creating a nuisance.

Elimination plant should possess an overall efficiency of at least 85 per cent. for all particles above that size. Tests on an electrostatic plant, using p.f., show that the efficiency was 90 per cent.; for dust above 30 microns in diameter it was 98 per cent., and below, 85.6 per cent. Of the 10 per cent. escaping, 93 per cent. was below 30 microns. The amount of dust emitted will be approximately in direct proportion to the load on the station; a wider diffusion will be obtained by using a number of chimneys. Dust-extraction plant is necessary with stoker-fired installations when high gas velocities and high rates of combustion are in use.

Soot-blowing considerably increases the concentration of dust in flue gases; so does an increase in gas velocity with increased boiler duty, or an increase in the number of boilers working on a common flue, owing to the prevention of the settlement of dust and the entraining of particles deposited in the flues when working at lower velocities. The more frequently the blowers are used, the less will be the accumulation of dust that will have to be carried away at each blowing.

The only satisfactory method of testing the efficiency of dust-extraction plant is to weigh the dust in the gases at as high a point in the chimney as is practicable. Provision for this should be made when the chimneys are under construction.

Various Systems of Treatment

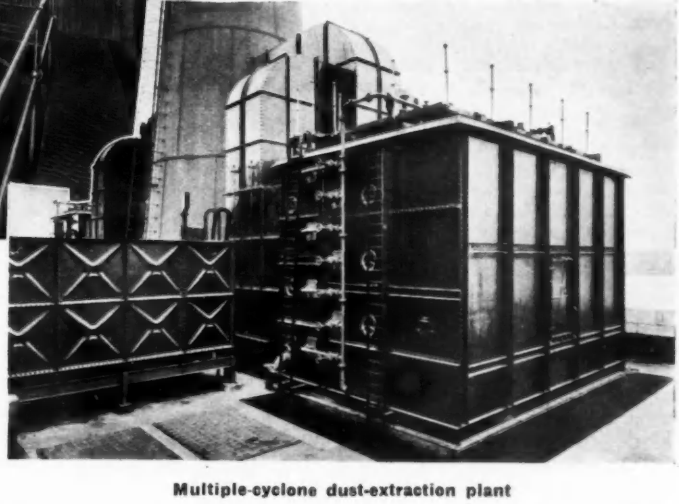
The types of plant available are divided into wet and dry systems; the former includes water film, water spray, and a combination of the two, and the latter comprises cyclones and electrostatic precipitators. With the wet system the solids must be reclaimed from the effluent, and, in some cases, the recovered water must be treated; the type with an automatic slurry thickener and rotary filter is better than one with settling tanks. The single-cyclone plant is regarded as unsuitable for pulverised fuel, as while its efficiency when dealing with dust above 40 microns is reasonably good, below that figure it falls away considerably.

In the electrostatic precipitation system a negative charge is imparted to the dust by passing the gases through an electrostatic field maintained by two sets of electrons at a high d.c. potential. The ionised dust is precipitated on to earthed positive hollow electrodes, where they lose their charge and fall into hoppers.

The comparative annual capital and operating charges are: water film, £710; combined water spray and film, £769; electrostatic, £900; multi-cyclone, £873. The dry plants require less floor space but greater cubic capacity than the wet; this favours their use where land is costly.

The Committee's Conclusions

The principal conclusions of the Committee are that:—(1) Dust nuisance is avoidable with new stations, but the application of means for its prevention to all existing stations may not be practicable; (2) The need is urgent for standardising reliable methods of testing the efficiency of dust-extraction plant and the grading of dust; (3) The electrostatic precipitator is the most suitable type for pulverised fuel installations and the use of water for dust extraction is not to be commended; (4) With certain conditions of design and operation no dust-extraction plant will be necessary with stoker-fired installations—otherwise the multi-cyclone type will be suitable; (5) The minimum height of chimneys should be two and a half times that of the highest point of the generating station buildings, plus an allowance for other local conditions where necessary; (6) The installation of the most efficient dust-extraction methods will not obviate the need to adopt precautions in the design and operation of boiler plant; dust must not accumulate where it can be disturbed by a sudden increase in flue-gas velocity, and soot-blowing should be frequent enough to prevent dust concentration exceeding the efficient limit of the extraction plant; (7) It is impracticable to formulate regulations governing the emission of dust, but if the above recommendations are carried out regulations will be unnecessary.



Multiple-cyclone dust-extraction plant

We are indebted to the Electricity Commissioners and the Stationery Office for their permission to reproduce the photographs accompanying this article.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Lessons From the Coal-mining Industry

AN interesting analogy between the coal and electrical industries was drawn by Mr. W. B. Woodhouse, engineer and manager of the Yorkshire Electric Power Co., at a luncheon of the BATTI-WALLAHS' SOCIETY on December 15th.

While lamenting the disturbed state of trade, Mr. Woodhouse said that the present times of trouble had the advantage that they taught us to appreciate a number of things more fully than we did twenty years ago. The greater community of interest and interdependence of various industries or sections of industries were a case in point, and it was also becoming more generally recognised that the producer was entitled to a fair reward, though the tendency for the producer to get too much and the public too little was also borne in mind.

Mr. W. B. Woodhouse, of the Yorkshire Electric Power Co.

One of the most notable features of industry to-day was the change of scale on which matters were conducted. Modern architecture designed purely for its functional purpose expressed very well the general point of view, but the larger unit did not necessarily denote simplicity.

Although coal-mining was 700 years old and electricity supply only fifty, they had many points of similarity, and both had been, or still were, being faced with the same sort of difficulties. Judging from experience in the coal industry there was one element of danger of which the electricity supply authorities must beware if they wanted stability, namely, that with increasing output there must be a corresponding reduction in price.

The Increased Use of Machinery

Coal-mining methods in Great Britain were to-day the most efficient in the world, and but for the increasing use of machinery the present position would have been even more serious than it was. The future of the industry depended on a still greater employment of machinery, and there was no doubt that when conditions improved the general use of electricity in mines was inevitable. As the best means of competing with oil competition, coal must be marketed not "raw" but as electricity, gas, oil, and other products.

Mr. Woodhouse deprecated the present uneconomic state of affairs under which all collieries worked part time instead of the most efficient working full time. The price of coal should not be more to electricity undertakings than to other purchasers under the mistaken impression that electricity was a rival. Other industries would do well to take note of the methods of production of electricity. Great Britain could compete effectively with other countries having large supplies of hydro-electric power available, and there was no lack of power for the establishment of fresh industries. Electricity had a very rosy prospect, and new uses and new markets were opening up every day. In the last six years the price of electricity had fallen by thirty per cent., while the amount of coal used per kWh generated had been reduced by thirty-five per cent.

On the distribution side the cost of supplying the consumer and providing mains had been very much reduced, and there were prospects of still greater reductions. As with improved load factor conditions undertakings could handle two or three times the load, there appeared to be plenty of opportunity for further development.

Municipal Control.

As a rule the control of electricity undertakings over a large area was much more profitable, and the industry at present was hampered by municipal ownership. Municipal boundaries had no relation to electricity supply; control could be obtained in other ways. In Mr. Woodhouse's experience one of the greatest difficulties facing electrical progress had been the opposition by municipal councils owning gas works. These authorities were, however, being persuaded to give electricity a fair chance, although there was still some opposition.

Different parts of the country required different methods, and there was something to be said for the regional basis. There were a number of engineering changes going on at the moment, and it was possible that such things as lighting and distribution methods would be completely revolutionised in the next few years. There was only one way in which electricity could succeed, and that was by increasing sales. The recent increase in the consumption of electrical energy for domestic purposes was notable, and the fact that more consumers were connected last year than in any previous one was particularly gratifying. Manufacturers were to be congratulated on the way in which they had reduced the prices of their products, for it was the availability of the cheaper apparatus that was largely responsible for the increase in the domestic load.

Electricity supply had become a symbol of national progress. So far about £400,000,000 had been spent on the electrical industry, and it was probable that a similar amount would be expended in the next ten years. Development could only take place if considerable changes were made. Attention must be paid to private enterprise, for this was best suited to the changing conditions, and a greater feeling of security must be provided in the future.

So far as electricity was an index of the country's position, there were definitely some signs of improvement, and with further increased efficiency of methods there was every hope that before long the prospects would be still brighter.

Can British Water Power be Profitably Developed?

THE presidential address of Sir Alexander Gibb to the JUNIOR INSTITUTION OF ENGINEERS was, owing to the author's indisposition, read for him by Mr. H. Beaver on December 9th. It outlines the future of water power in Great Britain and shows that, greatly valuable as are such resources, their development can only be described as an important, and not really a vital, element in our country's individual development.

The 1921 estimates of the Water Power Resources Committee were conservative. Since then plant of over 200,000 kW has been installed or has been put in hand. Further definite projects have been worked out, and in favourable circumstances 250,000 kW could be brought to early fruition. Since the war £6,000,000 has been spent on water-power development in this country, and £5,000,000 may be allowed for schemes in abeyance. The peculiar conditions of our country tend to restrict full advantage being taken of such sites as do exist. The length of transmission lines at present necessary may add 25 per cent. to the cost of development, thus detracting very much from the advantages of a scheme; moreover, compensation is apt to be heavy. It is by no means impossible for a promoter to spend over £50,000 and yet fail to obtain the powers he seeks.

There is room for a re-orientation of outlook on the part of many interests, for water-power development is fundamentally sound, though the total potential power would only represent about fifteen hours' output of coal a year. Sir Alexander hopes that it may not be impossible to devise a less costly and less hazardous method of obtaining the necessary powers than the present Private Bill procedure. If the water-power resources are to be developed to their economic capacity the whole of Scotland will have to be brought on to the grid. The Central Electricity Board should not only co-operate as it does now by financing and carrying out approved schemes sanctioned by Parliament, but should take the principal part—in the preliminary stages.

Electric Heating Discussed in Ireland

OUR Dublin correspondent says that a considerable audience heard Mr. A. H. Barker read his paper on "The Relative Fuel Economy of Electricity, Gas, Oil, and Solid Fuel as Heating Agents" (see ELECTRICAL REVIEW, December 9th, p. 852) at the Irish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS in Dublin on December 15th. The proceedings would have been more attractive and valuable if the author had been able to present to his hearers a clear-cut digest or a generalised summary of the main arguments with which his paper is concerned. Unfortunately, he ignored the larger number who had not been given an opportunity to study the paper before the meeting, directing most of his introductory remarks towards the demolition of criticisms encountered at other Centres, and warning an audience, which would have been better left free to use its intelligence, to keep off the grass here and to drive carefully inside the white line there.

In the circumstances the discussion was not particularly enlivening, the best spark in it coming from Mr. Henry, of the Electricity Supply Board, who said that, above all, he wished the electrical fraternity would rid itself of the attitude of mind which thinks it too amazing that electric heating should work out cheaper than the rival systems.

Coming almost on top of this a consulting engineer, who said he was responsible for the largest tubular heating installation in the Free State, described his relief at finding costs well below the colossal figure he seems to have feared.

The Irish representative of a famous fuel oil firm presented records of the actual cost of space heating in a dozen different types of building with oil-fired central heating apparatus. While the costs per cubic foot of space heated were given to three decimal places they were quite " in the air " in relation to the matter in hand as there was no chance to compare them with anything else.

Supply and sales engineers will derive little sustenance from any attempt they may make to digest Mr. Barker's paper. Give them one thing only—a space-heating high-load factor rate of somewhere between 0.3d. and 0.5d.—and they will tackle with utter confidence any competitive proposition.

Post-war Developments in High-pressure Boilers

IN opening the discussion on the paper by Messrs. C. H. Davy and C. H. Sparks at the INSTITUTION OF ELECTRICAL ENGINEERS in London on December 15th (which was referred to last week), Mr. W. E. Highfield pointed out that the development outlined by the authors and all that it implied had been due to the courage and ingenuity of mechanical engineers. The modern tendency was to surround the furnace entirely with water, which was the Cornish principle. There were two schools of thought as to the best way of getting the highest efficiency. One was that the most highly rated unit was the cheapest in first cost, and the other (which he inclined to personally) was that moderate rating was cheaper in the long run. The tubes themselves might possibly be changed in future, as gilled tubes were being experimented with. In future one must expect improvements in detail rather than bold and costly changes.

Mr. V. B. H. Mason, referring to the authors' remarks with regard to tube wall thickness, agreed that theory must be endorsed by practice before they could be sure about it. Mr. D. Wilson was of the opinion that old boiler men would not find anything new in the paper; it was merely a catalogue, full of data, which showed that most turbine requirements could be fulfilled by the boiler maker. Furnace and combustion chamber design was the most important aspect now. It was a pity that actual costs of the Billingham plant, which was one of the largest h.p. installations in Europe, had not been included.

Great Britain's Leadership

Mr. W. M. Selvey said he found that of 120 installations referred to only seven were in this country. There were just as many examples abroad which had been inspired by work done in England. They had made a god of experience, and so long as they continued to do so they would remain " seven out of 120." If this country was to progress, they must have " change." Not private enterprise, but men of vision were needed to give them that. Mr. J. Hamilton Gibson found nothing in the paper to interest marine engineers. Whereas the number of types of land boilers was legion, ships' boilers tended to become standardised. They could not afford the weight and space needed for auxiliaries to increase the present steam conditions of 400 lb. and 750 deg. F.

What of the Mercury-vapour Boiler?

Mr. W. S. Burge thought that the authors' curves showing the increase of cost due to increase of pressure of standard boilers required correction. Their curves illustrating the effect of increasing the feed temperature on the amount of heating surface contained in a complete stoker-fired unit would be extremely useful. Mr. C. Erith complained that much of what the paper contained had been published before. He would have liked to have seen more vertical tube types illustrated, and referred to the several large retort type stokers now being installed in this country. Why had the mercury-vapour boiler not been mentioned? Mr. S. B. Jackson discussed the economics of re-heating, suggesting that little heat was gained thereby up to about 300,000 lb. (boiler) and 30,000 kW (turbine), while above that size the increased capital cost nullified the gains obtainable. He desired to be assured of the reliability of high-pressure plant for long-period service without outages.

Mr. A. F. Webber asked if material advantages were obtainable from the use of alloy steels, and if such high steam conditions were safe. " Normal " steels might eventually be found more satisfactory. Major W. Gregson remarked that marine steam pressures had doubled while land pressures had been increased only 50 per cent. The marine case was more remarkable, as conditions were far easier on land. On ships simplicity was essential, and they could not re-heat steam by taking it back to the boilers through watertight bulkheads and other complications.

Mr. C. H. Sparks, in a brief reply, said that we had been somewhat backward in this country because managements had considered balance sheets before heat balances.

Two Christmas windows in Paris. The left-hand one is an all-electric kitchen in which Cook is teaching the daughter of the house how to use an electric iron. The other exemplifies electricity on the farm. The cow, which is being milked electrically, periodically swishes her tail in the farmer's face, and in the background there is a continuous procession of electrical farm equipment

Current-limiting Reactors

THE design and construction of current-limiting reactors are outlined in the paper which Mr. H. C. Goodman read before the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on December 13th.

The most widely known form of single-phase unit type air-cooled reactor is the cast-in-concrete design, which has been successfully used all over the world. In general, units should be mounted on centres equal to about three times their diameter. Below this the forces increase very rapidly, and mechanical reinforcement between units becomes necessary. This may take the form of an adjustable insulated compression strut, as that shown on p. 926, consisting of a substantial porcelain insulator fitted at each end with self-aligning metal fittings, one end being adjustable and arranged to automatically adjust itself to variations due to expansion and contraction. The struts may be fixed to the concrete piers between adjacent reactors or between each unit and the phase barriers, if these are provided.

Air-cooled cast-in-concrete reactors have been built for systems up to 33 kV, and there is no fundamental reason why

they should not be built for higher voltages. As, however, the next step is generally to 66 kV, the spacing of conductors in order to keep the voltage between turns within safe limits renders the overall dimensions so great that the space factor becomes the limit, and it is generally found more economical to use oil-cooled designs.

Transformer Design Followed

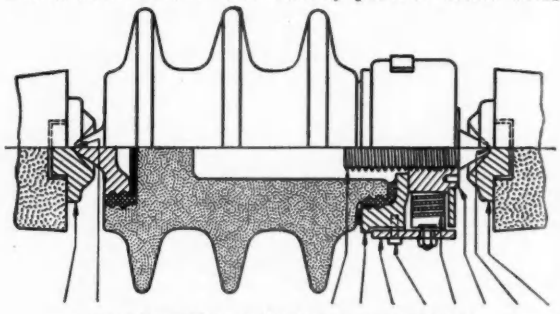
The windings, tanks, methods of ventilation, oil-cooling, and accessories are similar to those used in power transformer design, but as there is no iron core, there are no "no-load" losses, and the heating margin is inherently safe. Non-magnetic steel bolts are used for clamping the windings between end plates. Two special problems have to be dealt with, namely, (*a*) shielding the tank from the reactor flux, and (*b*) controlling the forces under fault conditions.

If the flux were allowed to enter the wall of the tank very high losses would be generated in the tank, even under normal current. There are three methods of shielding the tank: (*a*) lining the tank with low resistance non-magnetic circuits, so that by virtue of the current induced in these circuits the flux is kept out of the tank; (*b*) lining the tank with a shield of high-resistance magnetic material to provide a low reluctance path for the return flux; and (*c*) surrounding the coil with an iron shield so that, but for the air path inside the reactor winding, the rest of the flux path is in the iron. The metal-clad oil-cooled reactor finds its best application for outdoor use; for voltages in excess of 22 kV, either indoor or outdoor; and for indoor installations up to 22 kV where it is impossible or difficult to provide housings or cells for air-cooled reactors.

Discussion

Mr. F. C. Smith remarked during the subsequent discussion that the author had not said very much about the actual winding of the cast-in-concrete type, with which, he believed, there had been considerable trouble. How had the difficulty been got over and what was the composition of the concrete used? Mr. G. M. S. Sichel said that the effects produced when a short-circuit occurred on the busbars of a station with several big generators feeding the fault were sometimes almost beyond belief. That could be overcome by sectionalising the busbars and putting reactors in between. The forces must come on the reactors, but he had never yet heard of a case in which a reactor had failed under normal short-circuit conditions.

Mr. H. W. Biskehorn said that his experience and information were that the oil-cooled type had every advantage and none of the disadvantages of the air type. The oil-immersed type would obviate the necessity for cleaning and inspection. The dimensions given in the paper showed that the oil-immersed type occupied only 40 per cent. of the cubic space required by the cast-in-concrete type. Again, the losses bore no comparison with those of the air-cooled type, and, although slightly more expensive, it was very much better and more convenient in lay-out, whilst under short-circuit conditions the stray field set up was negligible. In Canada and America they were going over solidly to the oil-immersed core type of reactor. The iron-shielded type was somewhat cheaper to make. Moreover, reactors could be built up to 1,000 kVA three-phase without any type of shielding at all, and the company with which he was connected had supplied such apparatus to the Princes Rock (Plymouth) power station recently. Mr. A. G. Scaife remarked that the change of distribution on a network if a reactor was suddenly put into service would



An adjustable insulated compression strut

have some surprising results. It would probably be found that heavy feeders would be carrying light loads and smaller feeders would be carrying heavier loads, whilst ring mains connected to the system might possibly reverse. Mr. A. C. Hilling, the chairman, said he had had some reactors in service for six or seven years which consisted of bitumen cable wound on a concrete frame. They were out in the open and had never failed.

Mr. Goodman, replying, explained that in the construction of cast-in-concrete reactors a former was used of a flexible type and concrete was poured in afterwards. The composition of the concrete was a trade secret. He had never heard of any failures, and he could not be expected to agree that the air type could not possibly compete with the oil type.

Mr. Biskehorn said that in the last six months the two types had been in competition, and in no case had the air type been successful. Oil type reactors had been installed from very small ones up to 25,000 kVA at Newport and Blackburn. The author said it was news to him that Canada and America were entirely abandoning the air type. The only case for putting in reactors at all was when something else could not be done, for instance, by reasons of space or money. Sometimes it would be more economical to throw switches right out and put in something much bigger. In other cases it was possible to compromise; it was a question of capital expenditure.

Electric Land Tillage

IN a recent address before the ROYAL SCOTTISH SOCIETY OF ARTS, at Edinburgh, on "The Practicability of Land Tillage by Means of Electric Power," Major A. McDowall said it was possible to harness the distributing lines fed by the grid to the only paying load which the land had to offer—the tillage load. He mentioned the risks which would be run by a cable-fed machine, and went on to describe his electric tractor, the driving wheels of which are arranged in tandem fashion. By a skilful device it is easy and practicable to tie the tractor to a cable, the other end of which must be fixed to a stationary source. The tackle is so constructed as to allow powerful sets and high voltages to be used with safety. He contended that his "one way" method of ploughing saved time and land, too.

The drum and winding gear of Major McDowall's electric tractor

Dealing with the economic aspect of electrical tilling, Major McDowall pointed out that the more universal the use of electricity became, the cheaper would the method become. His own tillage price, for example, was 1d. per kWh, but universal electrical tillage would reduce the price to from .5d. to .75d. per kWh. Taking .75d. as a fair price, the cost per acre by experimental electric tractor would be 6s. 4½d., the corresponding cost with an oil tractor being 9s. 0½d. A refined and lightened electric tractor, he reckoned, could cut the cost per acre to 5s. 11d., a saving of practically 33 per cent. compared with an oil tractor.

A more subtle factor in favour of electric tillage, contended Major McDowall, was that farmers were replacing barn oil engines with electric motors, the current for which cost 2.75d. per kWh as compared with the land charge of .75d. If the electric drive was justified in the barn at 2½d. per kWh, it was a hundred times more so on the land with a charge of only ¾d.

Coal Mine Lighting

Some pointed references to the lack of interest in improving underground illumination were made at the monthly meeting of the South Wales Branch of the MINING ELECTRICAL ENGINEERS held at the Treforest School of Mines on Saturday last. Mr. J. B. J. Higham presided and Mr. R. H. Campin read a paper on "Underground Lighting, with Special Reference to Miners' Handlamps," in which he claimed that the light values pertaining in a large number of our collieries could be trebled, or even quadrupled, without increasing operation charges if the type adopted was one of the modern high-candle-power units. The proceedings concluded with a smoking concert and supper at which Mr. Higham again presided.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Electric Heating Pads

In your issue of November 25th we noticed a reference to this subject as reported in the *British Medical Journal*. The reply, however, to the complaint of a doctor who had experienced trouble with the flexible of the heating pad seems to have been overlooked.

The particular type of three-heat switch and flexible which he was using is not approved of by British manufacturers of these appliances, who as you know have a much more solid flexible which does not kink. Furthermore, if the electric blanket were used to warm the whole bed sufficient heat would be left in the bed to last the night, and as the blanket is removed before retiring it is quite unnecessary to have the current on whilst sleeping. Each appliance has its particular sphere of action and of course one cannot expect a pad to warm the whole bed.

THERMEGA, LTD.,
A. V. Summers,
Engineer and Manager.

London, S.W.1, *Dec. 13th.*

Unauthorised Interference

May I refer you to the article which appears on page 896 of December 16th issue under my name and draw your attention to the fact that the word "not" in the last line but two should read "any." I think you will agree that this alters the whole position.

J. W. SIMPSON,
Secretary, I.M.E.A.

London, W.C.2, *Dec. 16th.*

[The paragraph in question should have read as follows:—"The Section again only refers to 'the consumer,' but in view of the decisions in cases where such points have arisen, it may be safely assumed that any person acting on behalf of a consumer who does *any* act in contravention of the Section would be held to be guilty of an offence against the Section."—EDS., ELEC. REV.]

Portable Electrocardiographs

We notice in the report of the Radiological Congress in the current issue of the ELECTRICAL REVIEW, a description under the heading, "A New Electrocardiograph," and we feel it encumbent upon us to draw your attention to this description which is, in our opinion, likely to be a little misleading.

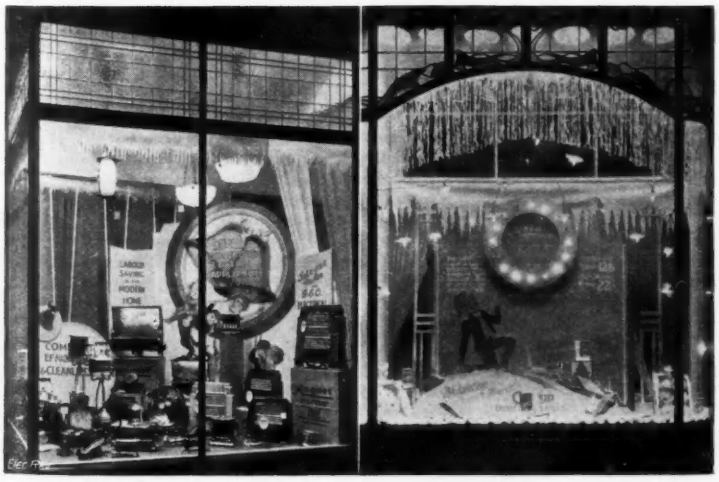
Portable electrocardiographs incorporating a thermionic valve system for amplifying the heart action have now been on the market for some four years. British manufacturers have been making them for three years. In addition to this, the Cambridge Instrument Co., has been manufacturing a portable electrocardiograph for the last four years. The accompanying illustration will show that the instrument is truly portable and we may mention that over a hundred of these instruments are now in constant use.

The Cambridge equipment operates on exactly the same system as the original apparatus standardised by Einthoven, which has been used in all the scientific investigations that have established the science of electrocardiography. The records obtained with this instrument, therefore, are strictly comparable with all published work, and the instrument does not possess many of the inherent drawbacks that are introduced with thermionic valves, such as their aptitude for picking up and amplifying stray alternating currents.

It is not the object of this letter to go into the respective advantages of the direct method over the valve method, but we feel that it is desirable to point out that the direct instrument which employs a sensitive string galvanometer cannot now be said to be a fragile instrument, and in support of this statement, we are able to say that there is a Cambridge portable electrocardiograph now in use that has taken over 300 electrocardiograms, and, it is estimated, has travelled some 3,500 miles in so doing. The "fragile" fibre of this instrument is intact and is still giving good service. We do not think that even valve filaments could be expected to stand up better to such usage.

The Cambridge "heart camera"

CAMBRIDGE INSTRUMENT CO., LTD.,
London, S.W.1, *December 16th.*



Two G.E.C. Christmas window displays: Left: At the Dorking premises of the London & Home Counties J.E.A.; right: The company's Croy don depôt

Radiated and Convected Heat

We have studied with great interest the varying views on electric heating expressed during the discussion following the reading of Mr. Barker's paper at the Institution of Electrical Engineers. There are evidences that the difficult problems connected with the efficient warming of lofty interiors by electricity are not completely understood even by engineers and authorities to whom we look for guidance on such matters.

On page 884 of your issue of December 16th there is published a photograph of the interior of an operating theatre. This photograph distinctly shows a row of "Electro-vapour" "radiators" placed immediately below a row of open top windows. Even the makers of these "radiators" would not claim a very high radiation factor for equipment of this type as they are primarily air warmers. Is it not clear that the warmed air rising from these heaters will simply pass outwards through the open windows into the external atmosphere? We can understand an engineer fitting radiators—that is true radiators—below, between, or adjacent to window areas to counteract the heat loss which takes place through the glass surface but does it not seem that it is a mistake to apply air warmers in this way?

We are commencing shortly an installation in a school employing equipment dissipating heat energy in the proportion of 68 per cent. radiation and 32 per cent. convection. Mr. Lesser advises a judicious mixture of radiation and convection, and we wonder what he thinks of this proportion in an interior averaging 20 ft. high. We agree with Mr. Grierson that radiant electric warming introduces a new technique of comfort when the system is properly applied and that this should be the most effective and the most economical method, particularly for lofty interiors. The school which we have mentioned is loaded to .65 W per cubic foot with radiation (allowing for radiation factor) at 8 W per sq. ft. floor area. We hope

to be in a position to submit a favourable report upon this installation in due course.

We would like to ask the heating engineers why thermostats are sometimes recommended on radiant heating installations. If a sense of bodily comfort can be produced by radiation more or less independent of air temperature, what is the use of fitting air thermostats—unless of course one falls back on the attainment and maintenance of an air temperature. Then one might as well have air warmers and be done with it. We do not see that thermostats can be expected to properly control radiant heating installations on air temperature alone.

Crowborough, *December 16th.* JOHN MCCONAGHY,
(McConaghy Brothers).

The Position at Littlehampton

With reference to the report in your issue of December 16th, of the action of the Littlehampton District Council in consenting to this company applying to the Electricity Commissioners for a Special Order suspending the special purchase powers of the Council in return for a price reduction, we have to inform you that at an extraordinary meeting of the Littlehampton Council on December 16th, this decision was rescinded and the Council now propose to apply to the Ministry of Transport for a price reduction.

It is interesting to note that for the second time in five years the Council have declined to accept the advice tendered by the eminent consulting engineer who they retained to advise them, though the price reduction offered by this company involved an estimated loss of revenue of £3,000 in 1933.

London, W.1, *Dec. 19th.* D. NAPIER-WHITTINGHAM,
Managing Director, Sussex Electricity Supply Co., Ltd.

Engineers as Managers?

It was with great interest that I read Mr. H. N. Munro's article on this subject as it expresses a little more forcibly the views contained in one which I wrote last year. The fact that there is a great lack of commercial intelligence among responsible engineers is one of the real reasons that load factors are still very low. Whilst my notes were intended to encourage apprentices to attend evening classes, I suggested that a period on the staff of a responsible contractor should be the means of thoroughly equipping the budding engineer.

It is only by having engineers in the distribution and consumers' departments, who, being thoroughly trained in general engineering, are thus able to visualise the success of their plans, that the grid scheme will be fully developed. As the underlying principle of the scheme is cheaper and more readily available electricity, distribution and consumers' engineers should be so selected that they are prepared, by example, to instil their own keenness into new consumers.

Unfortunately public bodies in making such appointments fail to visualise the years to come, and so we have so many undertakings which are not on a firm financial footing. The watchword of 1932 has been "economy"; this will never be achieved so long as the present-day incursions into the profession continue, for after all real economy will only be achieved by public bodies ensuring that the staffs have been trained along the lines we have indicated. It is to be hoped that in 1933 we shall be able to observe a real improvement in the methods and views of selection committees. PERNARD A. CRONIN.

Cardiff, *December 17th.*

Inadequate Mains: Indifferent Employés

In his article published in your issue of December 9th, Mr. R. D. Reynolds refers to "the recruitment of all persons engaged in the many branches of the electrical industry as a propaganda force."

Some ten years ago I entered upon this electrical engineering business as a keen youth home from boarding school and in private life I wasted no time in pointing out to my many friends the advantages of "doing it electrically." Since those happy days my ideas concerning "the electrical way" have received so many and varied jars that it is with considerable cautiousness that I enter into argument upon the subject.

Electric lighting as a form of illumination is far ahead of its rivals, but people will purchase 60-W lamps when they really need 100 W sooner than pay the exorbitant price of the latter. Again, if retailers are making a profit of 50 per cent. on electrical appliances, no matter how cheap the "juice" is on the whole, applied electricity is bound to be expensive.

About this time of the year mother will see a table-lamp in the shop window of the local "Authorised Plumber and Electrician" (the "authorised" referring to the "plumber" only), and will buy it as a Christmas present to herself from father. The lamp adaptor will be plugged into a pendant at home and the lamp will shed its bounteous radiance until it has been dragged off the table several times, due to its flex trailing through the air, and the family will then decide that a socket on the skirting board is required. By the time this job has been completed satisfactorily and a bill upwards of three times the cost of the lamp has been paid father will be glad indeed that Christmas comes but once a year.

I went into a brand-new £750 house of a friend only a few days ago and discovered that the total provision, apart from lighting, was a power plug in the hall and another one on the landing. Little progress will be made so long as people have to have their houses wired up for lighting and power separately.

With regard to heating. Does anybody—even Mr. Reynolds—honestly believe that it is possible to heat a room as satisfactorily by electricity as by coal and maintain an equal number of air changes without the cost being absolutely enormous? Perhaps the most obvious way of showing the public how expensive electricity is, is to lag the copper cylinders in airing cupboards. Any housewife can see that the heat saved on water-heating is lost in airing. Also, if lagging is required with electricity, why not with coal?

These and many other brickbats have I had thrown at me from time to time, but these are not all. For some years I have been a sub-station attendant in a corporation supply department. Of the executive staff one member only is connected with the I.E.E., and not a single member has a university degree and incompetence is rife. My ability to use a simple slide-rule has been sneered at by a mains engineer and I have been told point blank that "men with brains are not wanted here."

I am still as fond of this game as ever and am itching to get a more responsible job, but if conditions such as I have outlined obtain in other supply undertakings in this country it is little to be wondered at that electricity is expensive or that Mr. Reynolds finds employés who are indifferent.

December 17th. AN INDIFFERENT EMPLOYÉ.

Rubber and Gutta Percha

I was much interested in the remarks of Mr. J. F. W. Hooper in your "Correspondence" columns of December 16th regarding my article on "Rubber and Gutta Percha." While appreciating the valuable work that his company has done in developing rubber as a submarine cable insulation, I would also add that his criticism is most welcome, if only for the reason that it provides me with an opportunity of returning to a little matter concerning what might be called "American diplomacy."

My article was no attempt to discredit the worth of vulcanised india-rubber for this purpose. If it achieved any object at all, beyond outlining the general behaviour of rubber and gutta percha under electrical stresses, it may have served to offset, in some slight measure, the somewhat obscurantist manner in which the subject of gutta percha has been treated in American publications. Practically the entire credit for the great advances that have taken place in the technique of gutta percha insulation is due to British ingenuity and capital, with the result that our manufacturers are unrivalled in this field.

It was, I imagine, with the perfectly understandable object of assailing our position as world suppliers of cable that the investigation, to which my article referred, was undertaken by the American Bureau of Standards. Their results were anomalous, for, as I explained, the conclusion reached by the investigators was opposed to the unvarying attitude of British workers, who have amply demonstrated that water is the natural preservative of gutta percha. Perhaps I may be excused for reiterating a passage in my article: "... figures showing the premature breakdown of this material can be ascribed to exterior influences such as oxidation of exposed end of test pieces, or even incipient deterioration which has set in prior to the commencement of the test."

The graphs which were reproduced with my article were not an attempt to vindicate any particular point of view. They were merely intended to illustrate the sort of effect that water absorption has on the electrical properties of vulcanised india-rubber; their value lies in the emphasis they give to the large initial effects of water absorption. The treatment of the subject at this point in the paper was purely academic, as will be obvious from the consideration given to the effects of various fillers and reinforces on the electrical characteristics of rubber; in view of the shortness of the time of test, to have given the results for salt water would have provided no fresh information, besides tending to obscure the point that the properties illustrated are the direct result of the taking up of water alone.

I trust that this is sufficient reply to Mr. Hooper, who has, it may be, misconstrued my intention to establish a correct relation between rubber and gutta percha as an attempt to belittle the valuable part that the former has played in developing the insulation of cables. It must be remembered that the American researchers, unjustifiably as it turns out, unhesitatingly deduced that gutta percha was inferior for this work, and I am sure that Mr. Hooper would be among the last to desire the perpetuation of this erroneous idea.

FRANK A. MIDDLETON.

Osterley Park, Middlesex, *December 17th.*

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

"Ozonair" Ceiling Apparatus

The "Ozonair" ceiling model

The ceiling apparatus recently developed by OZONAIR, LTD., St. Leonard Street, S.W.1, combines a Ventex air filter and an ozoniser with a special fan for circulating the air in the room, and cleaning and purifying it at the same time.

It is made in two sizes. The smaller one is suitable for rooms up to 5,000 cu. ft., and is priced at £60 (a.c.) and £80 (d.c.), while the larger type for rooms up to 10,000 cu. ft. costs £20 more.

The standard finish is copper bronze, but any ordinary finish can be supplied at the same price. Oxidised silver costs 5 per cent. extra.

A Garage Electric Heater

A new electric heater known as the "Tunnel" for use in private car garages has just been marketed by MESSRS. BERTRAM THOMAS, Worsley Street, Hulme, Manchester. It has been designed for placing underneath the forward portions of cars so as to keep the engine warm generally and the lubricants fluid both in the crank case and gear box. The heater, only a few inches high, can be left on the floor of the garage and the car driven over it. The consumption is low, it being stated that the standard size, which is 3 ft. 1 in. long, 5 in. high, and 8¼ in. wide, is loaded at about 330 W. The heating elements are entirely enclosed in a steel casing so that they cannot ignite petrol or petrol vapour.

Magnavox Loud Speakers

A new and improved type of mains energised speaker is being marketed by MAGNAVOX (GREAT BRITAIN), LTD., 89, Kingsway, W.C.2. It is claimed on behalf of the new "Magna" series that the speakers provide fifty per cent. better sensitivity, eliminate almost entirely all undesirable resonances, and give a definitely improved quality of reproduction. The feature in construction which enables this claim to be made is the increased field strength which is due to the free use of copper and iron with a carefully designed magnetic circuit.

Striking Clocks

Up to the present there are only a few makers of chiming electric clocks. Among these are MESSRS. SMITH'S ENGLISH CLOCKS, LTD., 179/185, Great Portland Street, W.1, who have introduced this year several striking and chiming synchronous models.

The "Chester" chiming clock

The "Sussex" is priced at 95s. in oak (mahogany 10s. more), the "Somerset" at £6 in mahogany, and the "Surrey" at £4 in mahogany. All these strike the hours and half-hours. There is also a chiming model which can be supplied at seven guineas in oak and £7 17s. in walnut. It is known as the "Chester," and has a 6-in. silvered dial with blue hands. The measurements are 8¾ in. high by 14½ in. wide by 6½ in. deep.

An Electrode for Welding Aluminium

An electrode for welding aluminium and aluminium alloys known as "Aluminweld," has recently been developed by the LINCOLN ELECTRIC CO., Bush House, Aldwych, W.C.2. It is a 5 per cent. silicon-aluminium alloy and can be used for welding either sheet or cast aluminium components by the metallic or carbon arc. A flux coating on the electrode prevents excessive oxidation and dissolves any aluminium oxide formed during the welding operation. The flux coating also assists in giving a smooth operating arc. The resulting weld is without porosity and possesses high tensile strength. It is claimed that the weld can be polished satisfactorily with practically no discoloration.

A short arc at approximately 20 volts should be used with the coating practically in contact with the work. The current will vary with the thickness of metal to be welded, and the following data gives an idea of the proper values: $\frac{3}{32}$ in., 35-45 A; $\frac{1}{8}$ in., 55-80 A; $\frac{5}{32}$ in., 100-150 A.

The $\frac{3}{32}$ in. electrode is used for aluminium up to No. 19 s.w.g., the $\frac{1}{8}$-in. electrode for No. 14 s.w.g. to $\frac{1}{4}$ in. thick, and the $\frac{5}{32}$-in. electrode for aluminium over $\frac{1}{4}$ in. thick. Sheet, plate, and bar aluminium sections over $\frac{3}{16}$ in. in thickness should have the edges bevelled to form a 90 deg. "V" at the weld if welding from one side. In butt welding sheet or plate aluminium all the way through from one side a copper backing strip is usually used.

An operator can quickly learn to regulate his heat and speed so that the welds can be made all the way through without the customary backing. Movement along the seam or weld joint may be in either a forward or backward direction. "Aluminweld" is produced in four sizes, $\frac{3}{32}$ in., $\frac{1}{8}$ in., $\frac{5}{32}$ in., and $\frac{3}{16}$ in., in 14-in. lengths.

An Electrostatic Voltmeter

An electrostatic voltmeter reading 50-300 V is a new development in the range of Ferranti electrostatic instruments. Whilst the 100-450 V instrument was previously standardised as the lowest reading instrument of this type and proved to be of wide application, this new range should have a far greater scope. Its particular feature, in common with the other electrostatic voltmeters, is its absence of current consumption so that such an instrument will read the actual volt drop across, say, a valve anode without disturbing in any way the conditions at the time of test.

A Ferranti electrostatic voltmeter

A protective resistance is included in the case of the voltmeter illustrated to reduce damage due to burn-out on over-voltage. For this purpose fuses are quite useless, as the damage is done before the fuse has blown; similarly, alternative spark gaps generally cause the instrument to burn up on a flashover. The instrument is fitted with a 2½-in. dial in a case of moulded insulation material and is available in the switchboard flush and projecting patterns and in the portable pattern with two terminals at the base. It is made by MESSRS. FERRANTI, LTD., Hollinwood, Lancs.

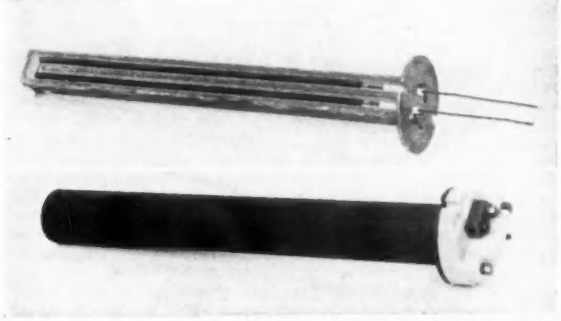
Withdrawable Embedded-type Immersion Heaters

A new embedded-type immersion heater recently developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, primarily for use in water heaters, constitutes a radical departure from conventional design.

It consists of a pair of nickel-chromium alloy heating coils accommodated in channels in a cast-iron former, the grooves being lined with refractory insulating material. The terminals are brought out through porcelain bushings, which pass through suitable holes in the circular mild-steel end-plate.

The remaining space in the grooves is filled with further refractory material, and the surface is finished off flush with the former. After being baked a sleeve of special aluminium alloy is moulded around it, providing a path of high thermal conductivity for the transmission of the heat. The heaters are made with a number of different loadings and in two diameters of 1¼in. and 1½in.

Each complete element contains two separate windings, which may be connected either in series or in parallel, or arranged for three-heat hand control. The heaters are



Above: The disposition of one of the coils in the "Magnet" immersion heater. Below: The heater complete with embedding cylinder and terminal block

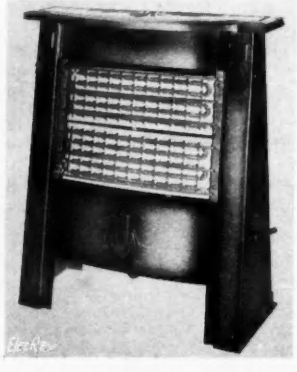
arranged to fit into tubular pockets in the water-heater, the aim being to secure the best possible fit between the aluminium cylinder and the wall of the tube. In practice, the maximum

clearance between the element and the wall of the pocket does not exceed about 0.03in., which ensures that the greater part of the heat will be transferred by conduction. A small proportion will, however, be transmitted by radiation, and the coat of dull black paint with which the heater body is finished facilitates heat transfer in this way, besides giving the element a neat appearance.

The outstanding advantages of these heaters are a robust construction, substantially lower operating temperature for the wire, and greatly increased life.

"Magnet" Fires

Two attractive fires have been added recently to the range of "Magnet" domestic equipment manufactured by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. These fires are constructed of sheet metal, finished in antique brass or antique silver with enrichments which make them suitable for use in a lounge or drawing room. They are loaded at 2 or 3 kW, and the elements, of the directly radiant type, are so arranged that in each case one is connected direct to the main terminals, the remaining one or two elements (according to size) being individually controlled by a switch mounted at the side of the fire. These fires are made conveniently portable by being fitted with a drop-down handle, while the flat top forms a convenient trivet for warming. Six feet of three-core circular maroon cotton braided flexible is included with both models. The 2-kW model, measuring 14 in. wide by 15½ in. high by 5 in. deep, costs £1 12s. 6d., and the 3-kW type, which measures 15 in. wide by 18½ in. high by 5¾ in. deep, costs £2 5s.



The new "Magnet" 2-kW fire

The "Silvertown" Wiring System

The outstanding features of the "Silvertown" wiring system are the unusual junction box and the measuring system embodied in the cables employed. The system has been designed by the INDIA RUBBER, GUTTA PERCHA & TELEGRAPH WORKS CO., LTD., to comply with I.E.E. wiring rules and other regulations

The construction of the box is quite simple: there are three essential parts (excluding the cover), a specially strengthened bonding clamp being designed to exert an even pressure over the whole surface of the bonding bar when the screws are tightened, so that the cables are gripped firmly between it and the base plate.

In order to insert cables on any side of the junction box, the four thumb-screws have to be unscrewed. A slight milling of the base prevents the cables from twisting laterally, while the special flange ensures that the middle cables are gripped as firmly as the outer ones.

There are no loose parts, and the box is completely self-contained. The two standard sizes are universally applicable to any type of connection. The small box, primarily for use as a straight-through or tee box, is slotted on three sides and marked on the fourth so that it can be used as a small universal box when required. The system embodies all the usual parts, *e.g.*, fixing clips, fixing saddles, bonding bars and clamps, earth clips, steel channelling, and porcelain connectors.

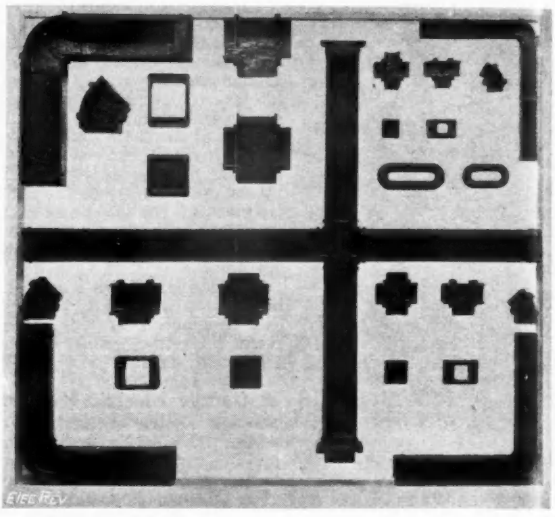
The feature of the "Silvertown Lengthmark" cable is that it is marked in clear figures at every five-yard length.

Junction boxes used in the "Silvertown" wiring system, showing the wires gripped between the bonding bar and base plate

A Trunk Conduit System

The POWER CENTRE CO., LTD., 15, Park Lane, Liverpool, has introduced a complete range of "Turret" trunk conduit, extending from 1½ by 1½ in. to 9 by 4 in., made up in standard 8-ft. lengths. The system is claimed to have a 50 per cent. greater capacity than ordinary conduit of equivalent area. It is designed to provide a cheap, safe and accessible means of carrying cables in large buildings and factories without risk of damage to the insulation during installation. For surface work it can be harmonised with the architectural features of a building interior.

We are informed that the system complies with the I.E.E. Wiring Regulations (127B) regarding continuity. The cover plate is secured at intervals to steel strips, which are easily removable to enable the cables to be easily pushed into place in the trough and secured pending the replacement of the cover. The fittings are of soft grey cast-iron and are provided with inspection covers. The standard parts will be identified from the accompanying illustration. Other applications of the system include shop-window lighting and stage battens. The conduit can also be used for building up small switchboards.



"Turret" trunk conduit. Top left, 4 inch; top right, 1½ in.; bottom left, 3 in.; bottom right, 2 in.

The Power Centre Co. is represented in London by Messrs. Pendry & Williams, of 92, Victoria Street, S.W.1, where we inspected the various components.

Marryat Electric Furnaces

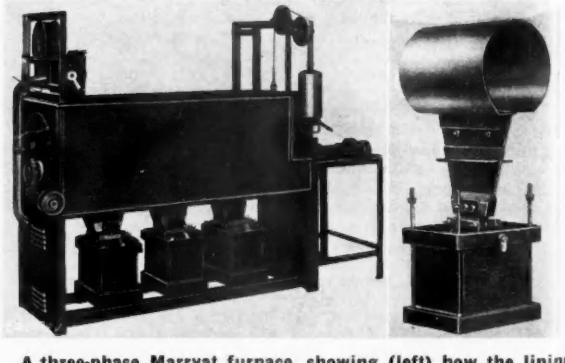
An important development in industrial electric heating equipment is represented by a furnace recently introduced by MESSRS. MARRYAT & PLACE, 40, Hatton Garden, E.C.1. It operates on the induced-current principle whereby the oven steel lining is actually the element and also the one-turn low-voltage secondary winding of a transformer.

Any working temperature up to about 950 deg. C. is provided with ease, and, owing to the fact that the element pressure never exceeds 4 V, the apparatus is absolutely safe. Temperature control is provided by means of tappings in the primary winding of the high-current low-voltage transformer, and by means of thermostatic control the temperature can be maintained within 2 deg. C. of any required value.

The uses for these machines are very wide, and include vitreous enamelling, annealing, assaying, case hardening, china finishing, glazing, and sherardising. Vacuum ovens are particularly easily made on this system, and are very reliable in service. These can be made to hold up vacuum for fourteen days or more, and owing to the very simple and robust construction can be made much more cheaply than the ordinary electric vacuum oven.

The following working statistics of a typical furnace are of interest:—Three drums are put in the oven at once, each drum measuring 15 in. long by 8 in. in diameter and carrying 100 lb. of small parts to be sherardised, making a total weight of 300 lb. per charge. The treatment takes 1½ hours and the furnace is charged eight times per day, thus giving an output of 1,800 lb. of work per day.

The loading of the furnace, which is a three-phase machine, is 12 kW—4 kW per phase. It is controlled thermostatically so that for a considerable period the current is switched off.



A three-phase Marryat furnace, showing (left) how the lining is both the heating element and transformer secondary

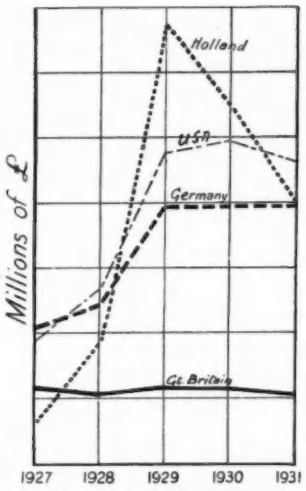
The Radio Export Trade. By A. J. S.

A brief study of recent developments

A CRITICAL examination of the export figures relating to the radio industry of this country during the last few years is not at first sight conducive to optimism, but certain conclusions justify hopes for a larger share of the overseas market in the future. For the purpose of a broad yet brief survey of the position, the following table has been compiled showing the value of radio exports of the four principal producing countries :—

	1927.	1928.	1929.	1930.	1931.
	£	£	£	£	£
U.S.A.	1,906,000	2,467,000	4,761,000	4,970,000	4,618,000
Germany... ...	2,099,000	2,467,000	3,944,000	3,910,000	3,905,000
Holland	758,000	1,887,000	6,732,000	5,486,000	4,013,000
U.K.	1,203,000	1,109,000	1,177,000	1,140,000	1,031,000

The figures above have all been converted at the par rate of exchange, and this consequently has a slight bearing upon the 1931 totals. The first and most satisfactory fact to be observed is that the total world demand for radio goods is growing steadily, so that any general improvement in trade will undoubtedly have far-reaching effects. The progress made by the different countries can be more readily followed from the accompanying diagram, which shows graphically the above table.



Radio exports of the four principal producing countries

The First in the Field

Up to the commencement of 1927, the United States, both by reason of its earlier start in broadcasting and of the advantages of very cheap production, rendered possible by its huge home market, had taken a leading position so far as the total value of exports was concerned. If the destinations of the U.S. exports are examined, it will be found that the trade with Europe and Asia is comparatively small, and that other American countries furnish the most important market, absorbing about 75 per cent. of the total; of the latter countries Canada is the most important individual market, taking about 13 per cent. of the total. Australia takes only about 10 per cent. of the total exports. Examined in the light of recent events, it seems probable that Australia, New Zealand, and to a lesser degree Canada, may in the future import rather more British wireless goods and rather less American than in the past.

Turning to Germany, here again the export figures speak well for the continued expansion of the industry. There is a steady upward trend in exports up to 1929, and even the slowing-down after this period can hardly be called serious when compared with what has happened in other trades. Approximately 80 per cent. of the total German radio exports go to European countries, about 5 per cent. to Asia, and another 5 per cent. to America. Of the European markets, Great Britain has in the past been the most important. Whatever might have been the case in normal times, there seems little doubt that in the future German exports will have to encounter very much keener British competition in European markets, more particularly in Holland, Italy, France and Belgium as a result of the exchange position. As a result of the abandonment of the gold standard in the Scandinavian countries, although British goods still cost practically the same, German prices have undergone an increase of approximately 30 per cent.

The Dutch Market's Striking Development

In the short history of the radio trade few things have been more spectacular than the sudden and extraordinary development of the Dutch export trade. Holland is now the largest exporter of wireless goods in the world. How this trade is distributed throughout the various countries of the world it is difficult to say, as the destinations are not published in official returns, but it seems probable that the main destinations are Great Britain, France, Germany, and the Netherlands East Indies, in the order named.

There finally remains to be considered the British position. It will be seen that during the period under review our exports have been practically stationary, in spite of the steadily growing market in all countries. In examining the destinations, it might at first be considered that countries within the British Empire would be the most important group of markets, but this is not so. In the same way as for Germany, but in a smaller degree, European countries are the most important field for British goods, the proportions being in the neighbourhood of 50 per cent. of the total going to European countries as against 30 to 35 per cent. taken by Empire markets. In Europe the most important individual markets are Holland, France, and Belgium, in the order named; while of Empire markets the most important is Australia, although exports to the Commonwealth have been declining for some years, due to the combined effects of local competition, an extremely high tariff against British goods, depression in trade, and depreciation of the Australian exchange.

A Forecast

In endeavouring to forecast the immediate future, we may say that British goods have at the present time the benefit of a reduction in price of about 30 per cent. due to the depreciation in sterling, although this is offset in many cases by extra duties designed to counterbalance this. In those Empire countries where the foregoing does not operate, there is the lesser advantage offered by the Ottawa concessions. The former of these two advantages seems likely to continue to operate for at least another year or two, during which time a great deal can be done to consolidate the position.

In many other classes of goods during the last twelve months overseas merchants and buyers have been eagerly turning to British sources of supply, where they formerly used to purchase only American or German goods, and the same trend is bound to make itself felt in the radio industry. Moreover, there is little doubt that world trade in radio is due for a further large expansion during the next year or two. Altogether a careful study of the position gives every reason for a feeling of optimism provided that there is adequate development work and a determination on the part of manufacturers to take the fullest advantage of the present exceptional position.

Electricity in Agriculture

THE report of the Development Commissioners for the year ended March, 1932 (Stationery Office, price 2s. net) refers to economies which have been made, the 1931-32 expenditure having been reduced by £150,000 to £560,000. Besides the annual grant from the Development Fund (£6,090 in 1931-32) towards the maintenance cost of the Research Institute in Plant Physiology, Imperial College of Science and Technology, additional grants aggregating about £10,000 were also made during the period 1917-1924 to meet the cost of investigations on the effects of electrical discharge on the growth of crops. These investigations, which included field experiments at Rothamsted, Harper Adams College, and Lincluden, Dumfriesshire, were supervised by a committee of experts constituted by the Ministry of Agriculture and Fisheries. Subsequently work on electro-culture was aided from the general maintenance grant to the Institute.

The subjects studied at the Institute of Research in Agricultural Engineering, Oxford University, included the use of windmills for the generation of electricity and drying processes for harvesting, and the preparation of crops for the market. Up to March, 1932, the Bedford Corporation had not applied for any advance towards meeting any deficit, if any, on its 100 sq. mile rural electrification demonstration scheme. At the commencement (April, 1930) the number of consumers already connected in the rural area was 1,125. The progress of the scheme up to March 31st, 1931, showed an addition of 279 consumers. Up to this date all the villages supplied were connected by means of underground cables. During the year ended March 31st, 1932, the number of consumers connected had increased to 2,357. The villages supplied numbered thirty-seven, of which four were served by overhead lines and the rest by underground cables. In addition to the actual consumers connected up to March 31st, 1932, there were on that date 185 applications outstanding. During the year 306 cookers were connected, bringing the total cookers connected in the year to 591.

As was mentioned in last year's report, the Development Commissioners feel some doubt as to how far the underground system of distribution is justified in a scheme of this kind, where it is important that the cost should be kept as low as possible, although it is claimed that the extra cost involved in this area is very slight.

The German Electrical Industries

THE returns of the Statistische Reichsamt for the year 1931 show a heavy decrease in the profits earned by German companies as a whole. The statistics relate to 1,166 concerns and give rather too favourable a view, says Dr. G. Plum in *Elektrotechnische Zeitschrift*, for many of the companies not included are in need of reconstruction. Of the companies considered, 680 (901 in 1930) show a net profit of 4.88 per cent (6.23 per cent.) on the 6,699 (9,842) million marks of capital involved; while 459 (251) show 28.84 per cent. (8.69 per cent.) net loss on 4,861 (1,258) million marks capital.

Electrical undertakings have not escaped from this downward trend, but the supply companies have fared much better than the manufacturing concerns. Returns relating to seventy-four electricity works (seventy-six in 1930), with 1257.9 (1207.2) million marks nominal share capital, show a balance of net profit over loss amounting to 53,100,000 (73,900,000) marks. The principal data for these concerns are shown in the first two columns of the accompanying table. Though the 1926-30 wave of investment has ceased, these figures reveal an appreciable further advance in the valuation of plant, notwithstanding an increase of nearly 3 per cent. in depreciation.

Soundness of the Supply Industry

The electricity supply undertakings form one of the few groups that have reinvested their whole depreciation allowance. Liquid resources remain satisfactory, and there is a striking increase in shares and securities held. The increase in paid-up share capital amounts to 53,300,000 marks, or nearly 4½ per cent., and the moderate increase in reserves is an indication of the strength of the industry. The enormous increase in the reserves of many other German companies results from reconstruction and is thus mainly an indication of past losses. The reduction in the supply companies' dividends is not alarming in view of the general decrease in interest rates, and the fact that these dividends have been paid without drawing on reserves.

The statistics for the electrotechnical industries are supplemented by figures for the third quarter of the year, in which fall the balance sheets of the A.E.G., Siemens & Halske A.G., and Siemens-Schuckertwerke A.G. The necessity for distinguishing between concerns which strike their balance during the third and fourth quarters respectively lies not only in the capital strength and far-reaching international relations of the first group, but also in the fact that economic conditions changed materially during the periods concerned.

The Continuance of Depression

The distinction is shown by the downward trend of plant and the heavy decrease in stores valuation in the fourth-quarter group. A special feature is said to be the "relatively good maintenance" of liquid resources (see footnote to the table). The reductions in paid-up capital are due primarily to the withdrawal of preference shares under the German measure for facilitating capital reduction. The reduction in long-term liabilities should be noted, and the distinctions between the two groups as regards depreciation allowance, net profit, and loss are significant.

The latest returns of the Berlin Chamber of Industry and Commerce, for the third quarter of 1932, show a further general retrogression in the German electrical industry. Retail trade continues to be adversely affected by the depression, and orders from the Reichsbahn and public departments and authorities have been insufficient to prevent a further decrease in turnover. Certain classes of electrical equipment, particularly those facilitating the economical operation of plant, show a slight improvement in business.

Most foreign markets are practically closed to German electrical products and small improvements in certain exports, including fire alarm equipment, have not prevented the total value of German electrical exports from falling to about 23,000,000 marks per month, compared with 42,000,000 marks per month for the corresponding period of 1931, a decrease of 45 per cent. Even compared with the second quarter of 1932, the decrease amounts to about 15 per cent. Conditions in Russia are unfavourable to any early revival of business in that direction.

	Electricity Supply Concerns.		Electro-technical Industries.			
			Third quarter.		Fourth quarter.	
	1930.	1931.	1930.	1931.	1930.	1931.
Number of companies	76	74	4	4	32	32
Nominal capital (millions of marks)	1,207.2	1,257.9	434.3	419.3	238.5	233.4
Assets (millions of marks).						
Buildings, plant, etc.	1,932.2	1,944.0	235.0	237.0	118.2	110.6
Stores	33.5	30.3	206.8	150.0	82.6	52.5
Shares and securities	292.4	358.7	479.5	463.1	77.7	73.4
Liquid resources	332.6	330.1	566.1	535.5	19.1*	188.8
Liabilities (millions of marks).						
Share capital paid up	1,192.1	1,245.4	433.9	411.9	237.3	231.5
Reserves	105.8	109.1	219.2	220.0	30.3	37.6
Welfare fund	11.7	12.5	22.7	23.5	1.4	1.5
Long-term liabilities	831.0	862.8	364.0	349.9	54.2	50.4
Creditors	383.3	386.7	411.7	387.1	141.8	134.2
Profit and Loss (millions of marks or per cent.)						
Depreciation	96.3	99.0	6.9	5.5	11.0	12.5
Net profit	74.4	53.7	33.1	8.7	11.3	5.0
Net profit, per cent. on capital concerned	6.04	4.06	5.17	1.37	4.23	1.86
Net loss	0.5	0.6	—	20.7	2.2	38.4
Net loss, per cent. on capital concerned	0.04	0.05	—	3.26	0.82	14.27
Capital ranking for dividend	1,126.7	1,213.9	420.6	414.3	236.9	231.5
Dividend paid	69.5	47.8	35.8	8.6	10.7	8.7
Dividend paid, per cent. on capital concerned	6.17	3.94	8.51	2.08	4.52	3.76

* Given thus in *E.T.Z.* but from the text, and for balance, it appears that the figure should be at least 190 million marks.

W. T. Henley

FIFTY years ago to-day this journal devoted a leading article to the death at the age of 68 years of W. T. Henley, founder of W. T. Henley's Telegraph Works Co., Ltd. (ELECTRICAL REVIEW, December 23rd, 1882). Henley's was a most remarkable career and reference was fittingly made to his dogged perseverance and undaunted spirit. What message could we have more appropriate to these days than comes to us from his achievements "in the face of difficulties which would dishearten and crush the majority of men"?

W. T. Henley was born at Midhurst, Sussex. At the age of sixteen he threw up his grandfather's business of leather-dresser and sought his fortune in London, beginning as a light porter with a Cheapside silk-mercer and subsequently working for five years as a dock labourer. He, however, taught himself the use of tools, and early morning and late at night, after his toil, he manufactured philosophical instruments. The sale of these at a chemist's shop brought him into touch with scientific men, and by the age of twenty-four he was employed by Professor Wheatstone in connection with his telegraph instruments. He forged ahead ambitiously in the instrument line and in telegraph work. Our article says :—

"It is related how, when hindered by the old Electric Telegraph Company, who had possession of all the railways, and had obtained a monopoly for overhead work, from erecting competitive wires, Mr. Henley retorted by digging trenches and laying underground wires from London to Carlisle, and from Dublin to Belfast.

"He afterwards built the telegraph works, twelve acres in extent, at North Woolwich, and made submarine cables one after another, employing for this purpose upwards of 2,000 men. He manufactured about 14,000 miles of submarine telegraph cables, the greater portion of which he also laid. Finding that purchasing his wire placed him at a disadvantage in competition, he laid down the machinery and plant for drawing his own wire at the North Woolwich Works. After a time this led to a works in Wales for making the wire rods, and later on sheet iron. Still later, Mr. Henley essayed the galvanising and corrugating of iron at North Woolwich. For some years he was extraordinarily successful, and then from reasons not necessary to mention here the North Woolwich works were reduced to a very small part of their original extent, and operations have since been carried on by a company formed for the purpose of taking over the business."

At his death he was engaged in perfecting a system of dynamo-electric machines and lamps for electric lighting.

If Henley could see to-day the enormous proportions and note the continued prosperity of the business of which he laid the foundations!

Parliamentary Notes

(BY OUR SPECIAL REPORTER)

ON December 14th Major Harvey asked the Under-Secretary of State for Air if he was satisfied that the overhead electric lines now being erected in the vicinity of Haldon (Teignmouth) aerodrome would neither constitute a source of danger to aircraft using the aerodrome nor in any other way impair its usefulness.

Sir P. Sassoon said that it was not considered that the overhead lines constituted a source of danger to aircraft using the aerodrome, or any material diminution in its usefulness, if pilots exercised reasonable care. The nearest point of the cable line was about 1,100 yards distant from the boundary of the aerodrome, and at that point the line was actually 130 ft. below the aerodrome level.

Main-line Electrification

On December 14th Mr. Gledhill asked the Minister of Transport whether, in reviewing all proposals connected with the unemployment problem, the Government would reconsider the recommendations contained in the Weir Committee's Report on the electrification of railways.

Mr. Pybus said he understood that the railway companies were pursuing their investigations into the problem of main-line railway electrification in the light of the Weir Report. They had informed him, in particular, that certain schemes of London suburban electrification were now under consideration, and that in the event of the London Passenger Transport Bill becoming law they would be prepared to submit proposals to the Standing Joint Committee of the Transport Board and the railway companies which the Bill proposed to set up.

Pedestal Telephones

On December 19th, Sir Gifford Fox asked the Postmaster-General if he would state what was the present remaining stock of pedestal telephones; by what extent this had been reduced during the past three months as a result of the intensive advertising campaign; and whether he would now consider the desirability of fitting all new installations with the new pattern telephone as a standard fitting without additional charge.

Sir Kingsley Wood said that the number of pedestal telephones belonging to the Post Office was about 1,750,000, including 300,000 in store. Within the past three months the number had been reduced by about 50,000, mainly due to scrapping. He regretted that he would not be justified, in view of the extra charge for depreciation which would be involved and which would have to be made good by telephone subscribers, in adopting the proposal contained in the last part of the question.

A Village Scheme

On December 14th Lord Scone asked the Minister of Transport if he was aware that the inhabitants of the district of Errol had been suffering inconvenience for many weeks as the result of the failure of the negotiations concerning the introduction of electricity into the village, and if he would consider arranging a meeting, to be presided over by an official of his department, between the parties to the Errol electricity supply dispute with a view to restoring to the inhabitants of the Errol district the artificial illuminants of which they were at present deprived.

Lt.-Col. Headlam said that the difficulty arose out of the company's reluctance to proceed in the absence of agreement as to compensation for a wayleave. He would be ready to adopt the suggestion for a meeting between the parties if they themselves were prepared to fall in with it.

The Penny Post

On December 19th Mr. Doran asked the Postmaster-General if he would consider an early return to penny postage in order to stimulate trade and national self-confidence.

Sir K. Wood said he was afraid that in present circumstances he could hold out no hope of the early restoration of penny postage.

In the Courts

THE Court of Appeal, consisting of Lord Justices Scrutton, Greer and Slesser, delivered judgment on Monday last in the test action brought by the St. James' & Pall Mall Electric Light Co., Ltd., against the City of Westminster Assessment Committee and Another on the appeal of the Committee from the judgment of a Divisional Court of King's Bench.

The company claimed that the gross and rateable values of the buildings, machinery, mains and appurtenances for the supply of electricity should be reduced from £110,000 and £55,001, respectively, to £72,664 and £36,332, account being taken of sinking funds which the company has to provide under the Act providing for the transfer of the company's undertaking to the London & Home Counties Joint Electricity Authority in 1971. The Divisional Court upheld this contention, holding that in arriving at the rateable value of the undertaking on the profits basis the sinking fund payments must be deducted from the profits, since a hypothetical tenant would not pay a higher rent to collect revenue from which he could derive no benefit. From this result the rating authority now appealed.

Lord Justice Scrutton, in the course of a lengthy written judgment, said that the decision affected all the metropolitan electricity supply companies, and, indeed, the practice generally followed in rating undertakings, whether commercial or public. He was impressed by the uncontradicted fact that rating assessment had proceeded for many years on the basis that sinking fund payments to return capital to shareholders had been treated as not to be deducted for rating purposes. He was reluctant to disturb a long established formula of rating and he could not find that the correctness had ever been seriously challenged before. He thought the Assessment Committee had adopted the correct procedure and that its decision must be upheld. In his opinion the view which the Divisional Court had taken as to sinking fund payments was contrary to the view which had never before been questioned. He was satisfied that the Divisional Court had come to a wrong conclusion and that the answer in the special case must be in favour of the Assessment Committee and the appeal allowed with costs.

Lord Justices Greer and Slesser also read judgments allowing the appeal.

A Patent Matter

Mr. Justice Farwell in the Chancery Division on December 16th heard an application in an action brought by Violite, Ltd., against Chapman & Low Tension Luminous Tubes, Ltd.

Mr. K. E. Shelley, for the plaintiffs, said that the application was for an order that the defendants should file a complete specification in pursuance of a provisional specification in order to keep the matter alive pending the determination of the benefit of the patents. The defendants had put in an affidavit stating that they had in fact filed the complete specification, and in those circumstances the relief asked for by the plaintiffs had been granted. The only thing that remained to be dealt with were the costs of the motion.

Mr. Gilbert Beyfus, for the defendants, said if the plaintiffs had made proper inquiries they would have discovered the facts.

His Lordship reserved the question of costs until the trial of the action and made no other order on the motion.

Alleged Breach of Regulations

At the Bilston (Staffs) Police Court last week Messrs. J. A. Jordan & Sons, enamellers and hardware manufacturers, were summoned for a breach of the electricity regulations under the Factory and Workshops Act. Mr. G. G. Sumner, Inspector of Factories, stated that an employé of the firm was dismantling a faulty lamp when he received a shock and fell from the ladder on which he was standing. Upon investigation it was found that the switch, which was "off" was in the return wire and therefore ineffective.

For the company it was pleaded that the offence was a technical one and the accident could not have been foreseen. A company which had carried out alterations to the electrical installation about a year ago had stated that apparently the supply wires had been changed over at a transformer.

The magistrate ordered the defendants to pay the costs of the case.

An Infringement Action Fails

In the Chancery Division on December 20th Mr. Justice Clauson heard an action brought by Mr. James McCreath, Bootle, against Mr. J. Austin Baker, general manager and engineer of the South Shields Corporation Tramways Department, claiming damages for the alleged infringement of the plaintiff's letters patent for an indicator to be used on electrically operated vehicles. The South Shields Corporation were originally joined as defendants but the action was discontinued against them on the footing that they would be bound by the decision against Mr. Baker.

Mr. McCreath, who appeared in person, described his invention. He said there had been negotiations whereby he was to grant to the Corporation a licence to use his indicator but they did not materialise.

Mr. Baker, who contested the validity of the patent, gave evidence, and stated that he was the inventor of the apparatus.

His Lordship, in giving judgment, said that the plaintiff had produced what appeared to be a perfectly satisfactory invention by which a number of indications at the same time were produced. Each of the machines which it was said infringed the patent, produced only one indication, so that it could not be said to do the thing which constituted the virtue of the plaintiff's patent. He held that the plaintiff's patent had not been infringed and dismissed the action with costs. He did not say whether the plaintiff's patent was a good one or not.

Former Wayleave Officer Charged

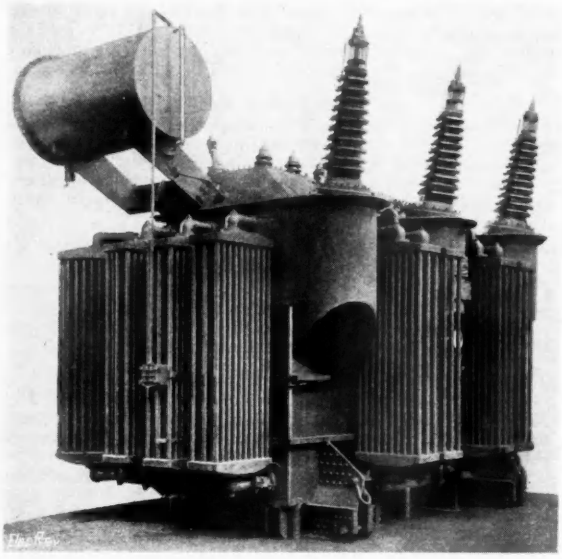
At the Norwich City Police Court on December 12th Ronald James Whitefield, a former wayleave officer employed by the Norwich Corporation Electricity Department, was committed for trial at the Assizes, bail being allowed, on several charges in connection with wayleave amounts received by him on behalf of the Corporation. Whitefield pleaded not guilty. Mr. Pullin, assistant solicitor to the Corporation, prosecuted, and Mr. R. Keefe was for the defence.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources, Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

British Transformers

An impressive pamphlet has reached us from the British Electric Transformer Co., Ltd., of Bush House, Aldwych, W.C., setting forth with imposing illustrations a statement of the policy of that company and Crompton Parkinson, Ltd., with regard to transformer manufacture. The B.E. Transformer Co. has been making transformers since the end of last century, and in recent years its activities in connection with the grid have been very marked. Nearly 2,000,000 kVA of transformers have been made for the Central Electricity Board. The company has advanced in its technical production operations as, during its life, the transformers have grown from a few hundreds up to tens of thousands of kVA, and voltages have increased in proportion. It is now manufacturing a complete range from instrument transformers to the largest sizes required. As our readers are already aware, the company has recently merged with Crompton Parkinson, Ltd.,



A 5,500-kVA Berry transformer supplied for the G.I.P. Railway, India

which represents fifty years' experience of motor and power plant. Under the amalgamation now referred to each company will maintain its own identity; experience will, however, be pooled and overlapping of design and manufacturing activities will be avoided; the home and overseas sales organisations will become one comprehensive whole. The illustrations and other contents of the pamphlet show transformers and substations in various parts of the country; a list of contracts received for the various grid schemes; and a lengthy list of representative users (corporations and companies, railways, public works and other authorities) at home and overseas, also great industrial works of all classes.

Duties on Battery Containers

The Import Duties Advisory Committee gives notice of an application under Schedule II to the Import Duties Act in respect of ebonite battery containers measuring not less than 22¼ in. by 14¼ in. by 35½ in. high. Any representations which interested parties desire to make with regard to this application should be addressed in writing to the secretary, Import Duties Advisory Committee, Caxton House, Tothill Street, S.W.1, not later than January 4th.

Mayfair's Telephones

The Alton Battery Co., Ltd., informs us that the batteries used at the new Mayfair telephone exchange (see December 9th issue, p. 861) are of Alton manufacture, and consist of a hundred cells with a capacity of over 13,000 Ah. Each cell weighs about four tons.

An All-electric Show House at Brighton

An all-electric show house was officially opened on December 16th in Brighton by Sir Cooper Rawson, M.P. for Brighton. This house, erected on what was formerly a derelict area abutting on the main street of Brighton, is typical of a number of houses forming building estates in the suburbs of the town, and the purpose of its erection is to save the time and add to the convenience of prospective purchasers of these houses by providing an easily accessible centre for inspection. It was erected by Messrs. Braybons, Ltd., Brighton, who have been responsible for building several hundred houses in the locality, while Messrs. H. J. Galliers co-operated on the electrical side. The electrical equipment, of G.E.C. manufacture, includes lighting fittings of pleasing design, a water-heater, cooker and wash-boiler; while in two of the rooms are electric fires of the fish-panel type.

New Municipal Showrooms

Bury St. Edmund's Town Council has approved, in principle, plans for the conversion of premises at Cornhill into a showroom for the electricity undertaking at an estimated cost of £1,200.

The St. Helens Corporation Electricity Department on December 16th opened its new showroom in Bridge Street. An automatic lift connects the various floors of the building, but it is on the first floor that the main showroom, which is devoted to the displaying of domestic appliances, is situated. An alcove is reserved for the purpose of showing how the model bedroom should be furnished and equipped electrically. On the top floor is a lecture hall arranged for demonstrations of various appliances

Bristol Electricity Supply Jubilee

The *Western Daily Press and Bristol Mirror* of December 20th, in drawing attention to the fact that this is the jubilee year of electric lighting in Bristol, quotes from one of its issues particulars of the operation of the Great Western Electric Light and Power Co., Ltd., which put twenty Brush arc lamps of 2,000 c.p. into a new warehouse in Bridewell Street, and carried on other installation business. Eleven years later the Corporation decided to provide a service, although the question first arose in 1882.

The British Industries Fair

The number of applications received for exhibition space at the Birmingham section of the 1933 British Industries Fair which is to be held from February 20th to March 3rd is a most encouraging sign of the growing confidence in the trade outlook for Britain's "heavy" industries. The Birmingham section has grown steadily year by year since 1920, when it was first organised. Extensions made for the 1933 Fair alone cover three acres, and have brought the total inside letting space to 250,000 sq. ft.—more than three times the space occupied in 1920. The events of Ottawa have resulted in increased interest in the Fair, and the fact that an increased number of leading manufacturers engaged in the heavy industries feel justified in making a new bid for world trade is a good indication of the belief of practical business men that trade winds are becoming more favourable to this country than they have been for a long time.

The following is a preliminary list of electrical exhibitors in the London section. Further lists will be given when available.

Attracta Electrical Co.
Automatic Coil Winder & Electric Equipment Co., Ltd.
Bakelite, Ltd.
Beetle Products Co., Ltd.
Bellingham & Stanley, Ltd.
Birkbys, Ltd.
British Blue Spot Co., Ltd.
British Hanovia Quartz Lamp Co.
British Ipso Battery Co., Ltd.
British Plastic Moulding Trade Association.
British Xylonite Co., Ltd.
Brownie Wireless Co. of Great Britain, Ltd.
A. F. Bulgin & Co., Ltd.
Bulle Co., Ltd.
Chloride Electrical Storage Co., Ltd.
E. K. Cole, Ltd.
Consolidated Radio Co., Ltd.
A. C. Cossor, Ltd.
Croydon Mouldrite, Ltd.
Dowsing Radiant Heat Co., Ltd.
Dubilier Condenser Co., Ltd.
J. J. Eastick & Sons, Ltd.
Ebonestos Insulators, Ltd.
Ever Ready Co. (Gt. Britain), Ltd.
Graham Farish, Ltd.
Fescol, Ltd.
Franco-British Electrical Co., Ltd.
Garrard Clocks, Ltd.
S. Guiterman & Co., Ltd.
Wallace Heaton, Ltd.
F. C. Heayberd & Co.
F. A. Hughes & Co., Ltd.
Ideal Home Electrical Co.
Imperial & International Communications, Ltd.
Imperial Chemical Industries, Ltd.
Insulators, Ltd.
K.F.M. Engineering Co., Ltd.
London Electric Service, Ltd.
Lorival Mfg. Co. (1921), Ltd.
Martindale Electric Co., Ltd.
Mavox All Electric Co., Ltd.
M.P.A. Wireless (1930), Ltd.
Geo. Nobbs, Ltd.
Ozonair, Ltd.
Partridge, Wilson & Co.
Pegasus, Ltd.
Philco Radio & Television Co., Ltd.
Plessy Co., Ltd.
Francis Shaw & Co., Ltd.
Smith's English Clocks, Ltd.
Solidite & Synthetic Mouldings, Ltd.
Standard Battery Co., Ltd.
Stratton & Co., Ltd.
James Swift & Son, Ltd.
Synchronome Co., Ltd.
Telegraph Condenser Co., Ltd.
Telephone Mfg. Co., Ltd.
Thermega, Ltd.
Ultra Electric, Ltd.
United Ebonite Mfrs., Ltd.
Univolt Electric Co., Ltd.
Vinces Dry Battery Co., Ltd.
Violite, Ltd.
Watmel Wireless Co., Ltd.
Wingrove & Rogers, Ltd.

A Russian Electrical Exhibition

An exhibition is being arranged in Moscow, to be opened in January next at the State Polytechnical Museum, with the object of showing the reconstruction of the systems of electrical communication and the lines of future development. The exhibition will be divided into eleven sections: Electrical

materials, electrical communications, telephony, telegraphy, wireless, generators, signalling, telemechanics, long-distance electrical transmission, telephotography, television, and sound films. Space is being offered free to foreign companies desiring to participate in the exhibition.

The Malvern Electricity Showrooms

Although the Malvern U.D.C. Electricity Department does not itself intend to sell electrical apparatus, it has recently opened new showrooms at The Exchange, Church Street. The idea of the showrooms is to make inhabitants of the town "electrically minded," and all sales resulting will be handled by the local electrical contractors. For the first fortnight after opening the premises were devoted to the special display of "Revo" appliances shown in our illustration, and cooking demonstrations were given morning and afternoon from Monday to Friday.

A "Revo" display at the recently opened showroom of the Malvern U.D.C.

Trade Depression in the U.S.A.

While there was a slight increase in the production of members of the National Electrical Manufacturers' Association (U.S.A.) during September as compared with August, the Association's *Survey* discloses a large falling-off in trade as compared with the corresponding month of last year. The following is an analysis of the production of reporting members during last September, with comparative figures for September, 1931, in parentheses:—A.c. motors (1-200 h.p.), $633,319 ($1,586,486); d.c. motors (1-200 h.p.), $137,704 ($413,864); fractional h.p. motors, $816,293 ($1,557,590); indoor power switching equipment, $20,316 ($40,586); outdoor power switching equipment, $45,139 ($188,043). In most sections more members sent in reports this year than last.

The E.D.A. Public Speaking Competition

The first area public speaking competition, organised by the British Electrical Development Association, was held recently in Bristol, with Alderman J. H. Inskip, chairman of the Electricity Committee, Professor Andrew Robertson, Dean of the Faculty of Engineering, Bristol University, and Mr. G. S. Francis (E.D.A.) as judges. The winners were Mr. B. C. Robinson (first prize, £5) and Mr. T. Elias (second prize, £3), both of whom are on the staff of the West Gloucestershire Electric Power Co., Ltd. Owing to the large number of applications in the London area, it has been necessary to arrange for eliminating competitions during January in several centres. The final test, at which the winners of the area competitions will compete, is to be held in London during March.

Britannia Batteries Sales Conference

Executives zone managers, sales staff and representatives from all parts of the country attended the semi-annual sales conference held recently by Britannia Batteries, Ltd., in London. The company entertained the party to luncheon at the Restaurant Frascati.

Local Exhibitions

Under the auspices of the Stewartry Electricity Department an electricity exhibition is being held in the Town Hall, Kirkcudbright, from January 9th to 14th.

Satisfaction has been expressed by the Formby Council's Electricity Department, of which Mr. James Scott is manager, at the success of the recent electrical exhibition which was organised not only to encourage the sale of appliances but to draw attention to the new inclusive tariff, by which it is hoped greatly to increase the number of all-electric houses in the township. By the end of the three days' exhibition there had been received forty-five applications for all-electric houses, eleven for radiators, and eight for electric cookers.

Messrs. T. J. Hulme's new showrooms in Derby

Change of Name

The name of the National Gas Engine Co., Ltd., has been changed to the National Gas & Oil Engine Co., Ltd.

Radio Trade in Finland

The popularity of radio in Finland is increasing, but so far the quantity of apparatus and components imported from the United Kingdom has been small, mainly for reasons of price and special terms granted to local importers. A recent Department of Overseas Trade report states, however, that since the suspension of the gold standard the prices of British goods have been more competitive and trade has improved.

New County of London Showrooms

The County of London Electric Supply Co., Ltd., has moved its Streatham showrooms and offices to larger premises at 1 & 2, Astoria Parade, almost opposite the old building.

Electrical Activities in Derby

To-morrow (Saturday) is the closing day of an electrical exhibition organised by Messrs. C. A. Newton, electrical engineers and contractors, St. James' Street, Derby, which was opened on December 5th. Derby Corporation had a large display of Jackson cookers and provided daily demonstrations. On the Hotpoint stand were washing machines, vacuum cleaners and fires. Messrs. Woodhouse & Co., Derby, exhibited an electric bathroom. Messrs. C. A. Newton had a large stand of Belling fires, cookers, &c. Other exhibits included "Swan" brand appliances, "Magicoal" fires, Ever Ready torches, G.E.C. and Ferranti clocks, Crompton lamps, &c. Derby Cables, Ltd., showed a number of examples of its products.

Messrs. T. J. Hulme & Son, electrical contractors, Sadler Gate, Derby, are holding an exhibition of electrical appliances and wireless in additional premises behind their showroom which increased business has compelled them to acquire. The accompanying illustration shows the company's new showrooms which have been recently opened.

Social Events

The high standard which Henley's Dramatic Club has led us to expect from its members was fully maintained last Friday when the Club presented "A Pair of Silk Stockings," a three-act comedy by Cyril Harcourt. Among the lady members of the cast, Miss Hilda Sneddon, as Lady Penelope Gower, again exercised her flair for portraying tight-lipped cynical elderly ladies; Miss Eileen Hannon played the "good sort," Irene Maitland, with her usual grace; Miss Hilda Starbuck was vivacious and charming as Molly Thornhill; Miss Edith Wade again did excellently as Pamela Bristowe; while Miss Joan Earl and Miss M. Davis completed the feminine side most adequately. The males were again led by Messrs. R. K. Edney and H. Stanley, as Capt. Bagnall and Sam Thornhill, whose competent handling of their parts proclaimed the old hands. Mr. W. G. Turner played Sirf John Gower, and Messrs. J. Hancock (Hugh Macintyre), R. Almond (Arthur Brook), N. F. King (Morgan), S. Butler (police inspector), and J. E. Tarling (tramp) gave excellent support to the principals. Credit for splendid off-stage work is due to Messrs. R. H. Edmead, H. Thornton, F. J. Bettley and H. Savage.

The annual concert of the Croydon and District Cricket League was held recently at which the president presented the trophies and prizes, the team of the Croydon Cable Works, Ltd., receiving the "Sportsmanship Cup."

At the annual dinner of the Aron Electricity Meter, Ltd., held at the Holborn Restaurant last Friday, there were about 300 guests. The speaker was the chairman of the company.

Mr. H. Kahn, who proposed the toast of the King. He was followed by Mr. A. White, manager of the company, who, before proposing the toast of the directors, told us what the directors were and did. Mr. H. Morgan, who is a director, responded, referring to the progress of the company. The toast of the visitors was proposed by Mr. L. Freeman in a lively speech, and a response was made by Mr. J. St. A. Jewell, managing director of British Taximeter, Ltd. Mr. H. A. O'Brien, director of Electrical & Engineering Products, Ltd., then toasted the staff, and Mr. E. W. Hill responded and was followed by Col. Crompton.

"Marryat's" gave their usual Christmas party at the Holborn Hall on the afternoon and evening of December 17th. During the afternoon a children's party was held from 3 to 6 p.m. which was attended by some 300 juveniles, who were entertained by a Punch and Judy show and a clown. In the evening the second and senior "Marryat" assembly took place, a dance being arranged from 7 p.m. until midnight, with supper and an excellent vocal entertainment. Some 400 employés and guests were present. The concluding stage of the dance was marked by the presentation to Mr. Marryat by his employés of a cheque to pay into the funds of the E.I.B.A. (formerly E.T.B.I.), while Mrs. Marryat received a bouquet.

The E.D.A. January window display

The annual whist drive and dance of the South Wales Electric Power Co. was held in Cardiff on December 9th, among those present being Mr. J. T. H. Legge (managing director), Mr. C. T. Allan (assistant manager), Mr. J. H. Dinham (chief district representative) and Mrs. Dinham, Mr. and Mrs. Hamilton Porter, and Mr. D. Ross (chief commercial officer) and Mrs. Ross.

The British Vacuum Cleaner & Engineering Co., Ltd., held its annual Christmas dance and whist drive on Monday last at Fulham Town Hall. Among those present were the Mayor and Mayoress of Fulham, Sir K. Vaughan Morgan, M.P., and Mr. H. C. Booth, chairman of the company. In a short address of welcome to the guests Mr. Booth mentioned that the company employed over 900 workpeople and claimed to have produced the first vacuum cleaner. There was an excellent attendance of over 500 members and friends, whose high spirits reflected the approach of the festive season. Hal Rhodes' band proved very popular, and dancing was still in full swing when we left at a late hour.

Recent Contracts

The Synchronome Co., Ltd., has received an order for the equipment of the new Corporation Electricity Department showrooms, Ferensway, Hull, with its "Synchronomains" system of electric clocks. There are twenty-eight internal clocks of various patterns, and two 8ft. diameter dials with illuminated hands and numerals which will be mounted at the top of the building. These dials will be synchronous motor driven. The illumination of the hands and numerals will be carried out by outlining them with 15-mm. lamps.

Messrs. A. Reyrolle and Co., Ltd., have received a contract for electrical switchgear to the value of £15,000 from the Cape Town Corporation.

The Hart Accumulator Co., Ltd., has received an order from Messrs. Siemens Bros. & Co., Ltd., for two batteries each consisting of twenty-five "STF"-type 67-plate cells, having a capacity of 9,900 A, to be installed in the new Gerrard telephone exchange.

Holophane, Ltd., has recently installed "Ripple-Lite" units for the lighting of the offices of the Midland Counties Mutual Benefit Society, at Dudley, and also in the new George Hotel at Wolverhampton.

Messrs. Lodge-Cottrell, Ltd., have recently received an order for a blast furnace gas cleaning plant from the British (Guest Keen Baldwins) Iron and Steel Co., Ltd., for their Margam works. This plant will have a capacity of one million cu. ft., measured at n.t.p., per hour, and it will be very similar to the Lodge-Cottrell installations elsewhere in this country, but improvements in automatic control will reduce still further the operating costs.

Orders have been received by Messrs. Mirrlees, Bickerton & Day, Ltd., for Mirrlees-Diesel engines from the following:—Barnstaple & Buckie Corporations; Jersey Electricity Co., Ltd.; Chester Water Works; Messrs. Robinson's, Ltd., Chesterfield; Beswick's Limeworks, Buxton; Messrs. H. & L. Slater, Ltd., Bollington; Oban Electricity Works; Herne Bay Waterworks; and Jackson's Paper Works. A large number of orders for similar equipment has also been received from India, Trinidad, Africa and Arabia. Of the orders mentioned above, approximately forty-six per cent. were repeat orders.

The E.D.A. January Programme

The principal feature of the January programme of the British Electrical Development Association is the arrangements made with regard to an ambitious national Press campaign; whole-page advertisements have been taken in four of the leading papers and two of the advertisements are reproduced in the programme. The window display for the month is devoted to electric fires, and, as will be seen from the accompanying illustration, fires of various designs have been selected. An important announcement is made regarding the Association's publicity matter; the prices and discounts have been revised, all previous lists being cancelled. Examples of posters and local advertisements for the month are illustrated, and a price list of publications, dealing with heating, lighting, &c., is given. The conferences arranged for the month are:—January 20th, at Caxton Hall, Westminster, S.W., at 7.30 p.m.: "Selling Demonstrations," by Mr. W. Attwood; January 25th, Northern Counties Area, Newcastle-upon-Tyne: "Air Conditioning Plant," by Mr. K. M. McKenzie; January 4th, North Midland Area: "Heating of Water by Electricity," by Mr. A. C. Bostel.

Christmas Windows in Paris

For the first time for many years Paris will miss her Christmas electrical pictures. Every Christmas all the large stores used to charm both Parisians and visitors to the city with delightful stories told through electric signs. This year not one is to be seen. Perhaps it is because of the crisis, or perhaps because of the loss of M. Jacapozzi, for it was he who used to design the signs, stories, and amazing flood of coloured electric lights. He died a few months ago. But what is missed in one way is compensated for in another. The "O.C.E.L." has come to the rescue, and is delighting Paris with both amusing and interesting windows. The large drapery stores always have such windows at Christmas time; never, however, has an electrical organisation troubled to take such pains as the O.C.E.L. has done this year. Two of the tableaux are illustrated on page 925.

Trade Announcements

The necessary formalities having now been completed, the name of the company owning the ELECTRICAL REVIEW is "Electrical Review, Ltd.," in place of E.R. (1930), Ltd.

Mr. John D. Mackenzie, engineer and agent, of 178a, Bath Street, Glasgow, has removed to 247, St. Vincent Street, C.2, and has taken over the representation in Scotland of Messrs. Berkeley & Young, Ltd.

The British Porcelain Co., Ltd., has removed to Vincent House, Vincent Square, S.W.1.

The United Dominions Trust, Ltd., has removed to Regis House, King William Street, E.C.4.

Messrs. Phillips & Turner, electrical fittings manufacturers, have removed to 78, Lombard Street, Birmingham, and are now associated with Messrs. Westbury & Griffiths of that address.

Mr. Samuel Baxter has secured larger premises at Thames Factory, Rainville Road, W.6, and from December 28th will carry on his business at that address.

Engineering Products, Ltd., and Industry & Commerce Alliance, Ltd., have moved to 99, Nightingale Lane, S.W.12 (Telephone: Battersea 1348-9). The telegraphic addresses are respectively "Indicace and Inducomal, Wandscom, London."

Radio Trade in Poland

According to a recent report issued by the Department of Overseas Trade, the importation into Poland of radio apparatus is so severely restricted by the high customs duties, which are based on weight and not in proportion to value, that the market is only accessible to very special receivers not made in the country or to such components of light weight and high value which, owing to their complexity, it would not pay to manufacture locally. Such receivers are usually too expensive for the general public under present economic conditions.

The Brazilian Market for I.C. Engines

A report of the market for internal combustion engines in Brazil has been issued by the Department of Overseas Trade. The total imports of these engines has fallen from 680,314 kg. in 1930 to 224,312 kg. in 1931, the United Kingdom's share decreasing from 127,058 to 26,975 kg.

Calendars, Diaries, Etc.

A water-colour of the Dove Holes, Dovedale, near Bakewell, is the subject of the D. P. Battery Co.'s attractive calendar.

Monthly sheets with sketches relating to some of the company's outstanding achievements form the 1933 calendar of Messrs. C. A. Parsons & Co., Ltd.

The Wardle Engineering Co.'s diary is of the page-a-week variety and with its flat-bound leather cover takes up little room in the pocket.

"London's Gateway," a water-colour sketch of the Thames, makes a very attractive subject for Messrs. Christy Bros. and Co.'s calendar.

Superb views of Alpine scenery appear on the calendar of the British Brown-Boveri, Ltd.

Messrs. Thomas R. Hills have sent us a neat page-a-week wall calendar.

Monthly sheets on a brightly coloured background form the striking calendar of the Enfield Cable Works, Ltd.

A telephone card of attractive design has been received from the County of London Electric Supply Co., Ltd.

Christmas greetings are sent us by the Croydon Cable Works, Ltd., on a card made of "Pernax" flexible insulating material.

Messrs. Francis Polden & Co.'s 1933 diary is bound in bright red leatherette and contains two pockets. A good deal of information on a variety of subjects is included. Their wall calendar has monthly slips with a date-marking device.

The "Underground" has again issued from 55, Broadway, S.W., a book of "Appointments" for the new year wherein, in addition to engagement spaces for morning, afternoon, and evening every day, are given numerous excellent illustrations forming a pictorial record of some curious and historical features of London.

The 1933 diary of the Brush Electrical Engineering Co., Ltd., is neatly bound in dark red leather with an elastic band.

We have also to acknowledge cards conveying the season's greetings from a large number of our readers and desire to convey our thanks and best wishes to them.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, Etc.	Price Dec. 21st.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, Etc.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-fiction Metals—		
Grade I ... ... per ton net	£141	£2 dec.
Grade II ... ... ,,	£100	£1 dec.
Grade III ... ... ,,	£55	—
c Brass (rolled metal 2" to 12" basis)... per lb.	7d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	8¾d. to 9d.	¼d. dec.
c ,, Wire, basis ... ... ,,	7¾d.	¼d. dec.
c Copper Tubes (solid drawn)... ... ,,	9¼d.	¼d. dec.
g ,, Bars (best selected)... ... per ton	£61	£4 dec.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d ,, ,, Sheets ... ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£42	—
d ,, ,, H.C. Wire ... per lb.	6 7/8d.	⅛d. inc.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
a German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¼d.	¼d. dec.
i Iron, Pig (Cleveland No. 3)... ... per ton	58/6	—
i ,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g Lead, English pig ... ... ,,	£12 15s.	15s. dec.
g Mercury ... ... per bot.	£10 5s. to £11 2s. 6d.	2s. 6d. to £5 dec.
e Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1d.	—
p ,, ,, drawn bars & rods ,,	10¼d.	¼d. dec.
p ,, ,, rolled strip & sheet ,,	10¾d.	¼d. dec.
p ,, ,, wire ... ... ,,	11⅜d.	¼d. dec.
o Platinum ... ... per oz.	£9	10s. dec.
d Silicium Bronze Wire ... ... per lb.	7⅞d.	⅛d. dec.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English)... ... ... per ton	£150 10s. to £152 10s.	£2 5s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

Messrs. James Forster & Co., writing on December 17th, state that the lead market is now on a sounder basis, and should respond to any improvement in industrial conditions. Imports during November amounted to 28,730 tons, and exports to 2,252 tons, leaving 26,478 tons for home consumption.

New Catalogues and Lists

Barker, Young & Co., Ltd., Vincent House, Vincent Square, S.W.1.—Several publications relating to the company's "Unity," "Electrorad," and "Morganite" heating systems and the "Unity" water heater. A description of a new temperature-sensitive time switch is included.

British Insulated Cables, Ltd., Prescot, Lancs.—Catalogue No. C.1.D., an eighty-four page description of the B.I. wiring system.

Ferranti, Ltd., Hollinwood, Lancs.—Pamphlet No. Wa.513 (price 6d.) giving full constructional details of a number of Ferranti power amplifiers and receivers.

English Electric Co., Ltd., Stafford.—Lists Nos. 62, 68 and 71, dealing with high-torque motors, vertical-spindle motors, and contactor control gear.

W. Canning & Co., Ltd., 133-137, Great Hampton Street, Birmingham.—A leaflet on spraying equipment for lacquer.

Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, W.1.—Leaflets describing some of the most popular "Hotpoint" domestic appliances.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. —Price list No. C.6427, giving revised prices of "Genalex" conduit fittings. Also an illustrated brochure on hotel and restaurant lighting, and the "Osram Bulletin" with a progress sheet announcing recently G.E.C. developments, etc.

J. G. Statter & Co., Ltd., 16, Great George Street, S.W.1.—Leaflet No. X206, giving detailed particulars of a new pattern round tank e.h.p. oil-immersed circuit breaker.

Isenthal & Co., Ltd., Victoria Road, North Acton. — An illustrated list (No. M. 1132) of mercury switches and relays for industrial and laboratory control.

David Brown & Sons (Huddersfield), Ltd., Park Works, Lockwood, Huddersfield.—Illustrated brochures on gears for automobile and marine use.

A. P. Lundberg & Sons, Ltd., 477, Liverpool Road, N.7.—Leaflets E1. 102 and 103 dealing respectively with the new "Speedy" double-pole switch-in-line and "V.C.S." switch.

A new "Osram" lamp cut-out. An equally attractive design relating to automobile lamps is also available

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—Publications Nos. 516 and 541 giving particulars respectively of enclosed lighting units and the new opal "Varyalite" lamps.

R. Cadisch & Sons, 5 and 6, Red Lion Square, W.C.1.—The December issue of the "Cadison Bulletin" containing details of a number of popular lines.

Philips Industrial, 145, Charing Cross Road, W.C.2.—A folder pointing out the merits of the "Metalix" X-ray tube.

Soapstone Products Co., 6, Holborn Viaduct, E.C.1.—A catalogue (No. 45) of electric radiators with details of the new "Model 170."

A.C.E.C., 56, Victoria Street, S.W.1.—The December stock list of electric motors, transformers, &c.

British Rola Co., Ltd., 179, High Road, Kilburn, N.W.6.—A folder describing various types of "Rola" loud speakers.

Bankruptcy Proceedings

H. W. Martin, wireless engineer, 209, Moulsham Street, Chelmsford, Essex, late of Chadwell Heath, trading as the London Radio Co.—The adjourned examination was held recently at the Shire Hall, Chelmsford. A statement of affairs had been lodged which disclosed liabilities of £731, and a deficiency of £585. The examination was closed.

R. T. G. Mason and **W. T. Burrell** (trading as the Wholesale Radio Components Co.), 9, Victory Parade, Sutton Road, Prittlewell, Essex.—The receiving order was made on a creditor's petition recently, and according to the statement of affairs, the joint liabilities amount to £437, and the assets are estimated to realise £6. The debtors attribute their failure to "insufficient profits to meet overhead expenses and partners' drawings." The separate estate of Mason shows unsecured liabilities of £190 and no assets, whilst that of Burrell shows unsecured liabilities of £199 and no assets.

R. H. Betts, gramophone and wireless dealer, 488, Gorton Road, Reddish, Stockport, Lancs.—The adjourned examination was held recently at the Court House, Stockport. Questioned concerning certain accumulators which were stated to have been worth £1,000, and which he had disposed of for £100, debtor said that that figure was the highest he could obtain. The examination was adjourned for closing.

P. Howden (Bradford Radio Service), wireless dealer, 73, Otley Road, Bradford.—Receiving order made December 2nd on debtor's own petition. First meeting to-day (Friday) at 71, Manningham Lane, Bradford. Public examination, January 10th, at the County Court, Bradford.

A. Roberts (Castle Radio Manufacturing Co.), wireless and electrical manufacturer and dealer, 161, Westminster Bridge Road, S.E.—Last day for receiving proofs for dividend December 24th. Trustee, Mr. F. T. Smith, 150, Southampton Row, W.C.

F. B. Jewkes (Jewkes Radio and Battery Service), radio engineer, 5, High Street, Wordsley.—Last day for receiving proofs for dividend December 23rd. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver.

Electricity Supply

Lighting, Domestic, Power

Accrington.—MAINS EXTENSIONS.—Mains extensions are to be carried out in Maden Street, Birtwistle Street, and Paxton Street, Accrington; Wesley Street and Haworth Street, Oswaldtwistle; and Canal Street, Church.

Acton.—COUNCIL HOUSE SUPPLIES.—The Housing Committee is to circularise tenants with regard to the proposed installation of electric lighting in the Council's houses.

Ammanford.—CHANGE-OVER.—The Urban District Council is to apply for sanction to a loan of £8,631 in connection with the proposed change-over from d.c. to a.c.

Bala.—PROSPECTS OF SUPPLY.—The Council has decided to submit to the North Wales and South Cheshire Joint Electricity Authority the correspondence which has passed between the Council and the North Wales Power Co. with reference to the supply of electrical energy to Bala. It has been estimated that a h.p. line will cost £6,000, a transformer and sub-station £2,500, and the distribution system £2,000. The company has intimated that if Bala will raise £6,000 the erection of a line can proceed.

Blackpool.—EXTENSIONS.—The Electricity Committee has decided to proceed with an extension of mains in the South Shore district.

Bretherton (Lancs).—SUPPLY INAUGURATED.—A supply of electricity provided by the Lancashire Electric Power Co. was inaugurated last week by Mr. J. Alleyne Robinson.

Brighton.—PUBLIC LIGHTING.—The Electricity Committee has approved plans for public street lighting, costing £322, on a section of the Whitehawk Estate.

Bromley (Kent).—MAINS EXTENSIONS.—The Town Council has decided to carry out mains extensions costing £8,959 as an unemployment scheme.

A NEW TARIFF.—An all-in domestic tariff has been added to the list of charges providing for prepayment by slot meter, with a standing charge of 7½ per cent. on the rateable value. There is a meter rent of 2s. 6d. per quarter, with an addition of 1d. per kWh, or where an electric cooker, and/or an electric water heater are installed, ¾d. per kWh.

Burton-on-Trent.—MAINS EXTENSIONS.—Sanction has been received to the borrowing of £4,912 for mains extensions to Rosliston, Walton, Coton-in-the-Elms, Caldwell, and Lullington.

Burwash.—A SUPPLY AVAILABLE SOON.—The Weald Electricity Supply Co., Ltd., is extending its mains from Heathfield to Burwash by an overhead line, and a supply of electricity will shortly be available.

A seasonable display of "Xcel" domestic apparatus in the showroom window of the Barnsley Electricity Department

Cheltenham.—BIRDIP VILLAGE SUPPLIES.—The West Gloucestershire Power Co., Ltd., has raised no objection to an application by the Corporation for an Order to take in premises in Birdip Village, and the Electricity Committee is to apply for sanction to a loan of £2,952 for carrying out the scheme.

Clitheroe.—FURTHER EXTENSIONS.—The Electricity Committee proposes to carry out a survey with a view to extending the Corporation's electricity supply system from Chatburn, *via* Downham and Rimington to Gisburn; to Bolton-by-Bowland, *via* Sawly; to Chaigley, *via* Higher Hodder Bridge; and to Mytton, *via* Edisford Bridge and Withgill.

Cockermouth.—OVERHEAD LINES INQUIRY.—An inquiry has been held by the Ministry of Transport into the objection of the Cumberland County Council to the erection of overhead lines in the area by the Mid-Cumberland Electricity Co., Ltd., in connection with the grid scheme. The Council's objections were based mainly on the grounds that the poles would obstruct traffic, and overhead lines were dangerous as they might be blown down.

Colchester.—E.H.P. LINE CONSTRUCTION.—The City Council has received sanction to a loan of £3,000 for the construction of an e.h.p. line from East Bergholt to Brantham.

Croydon.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £7,937 to the Waddon Factory Estate and elsewhere, and is to replace h.p. feeders and rearrange the l.p. network in the Thornton Heath area at a cost of £515.

Dover.—SUPPLY TO ST. MARGARET'S.—The Town Council has received sanction to a loan of £2,250 for work in connection with a supply of electricity to St. Margaret's.

Dumfries.—NOW IS THEIR CHANCE!—In connection with its electricity distribution scheme the County Council has published a list of subsidiary distribution mains, and points out that their erection is contingent partly upon the revenue which may be derived from the line and partly upon the number of prospective consumers who agree, prior to January 14th, to take supplies when they become available. The cost of lines erected now (while the unemployment grant is available) will be borne by the Council, but lines will not be erected later unless the persons desiring supplies contribute toward the capital cost.

Dunkeld and Birnam.—SUPPLY DELAY.—Mr. R. Inglis, factor to the Atholl Estates, stated at a recent meeting of the Highland District Council that he was being held responsible for the delay in the introduction of electricity into Dunkeld and Birnam because he would not allow the amenities of Dunkeld House (the property of the Duke of Atholl) to be sacrificed. The Grampian Electricity Supply Co., he added, could settle the matter by putting underground cables opposite Dunkeld House. The Council is to communicate with the company on the matter.

Ealing.—LOANS SANCTIONED.—The Electricity Supply Committee has received sanction to the borrowing of £5,000 for house wiring, and £15,000 for the provision of consumers' electrical apparatus.

Gillingham (Kent).—REPLACEMENT OF MAINS.—The sizes of the l.p. mains in about nine miles of streets in the borough are to be enlarged at an estimated cost of £9,750.

OVERHEAD LINES.—Application has been made to the Ministry of Transport for consent to use overhead lines at Rainham.

Great Yarmouth.—LOANS.—The Town Council is to apply for sanction to loans of £20,000 for mains, £5,000 for sub-station equipment, £5,000 for meters, and £5,000 for house wiring installations.

Hartley Wintney.—COUNCIL HOUSE INSTALLATIONS.—The Rural District Council has decided to accept the offer of the Mid-Southern Utility Co. to install electric lighting at Council houses at Hartley Wintney, Odiham and North Warnborough, if no cost falls on the Council. The company has been given sanction to erect overhead l.p. lines at Odiham.

Hastings.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to Arndale Bridge (£205); to the church and properties near the Black Horse Inn, Battle (£200); and to Chantler's Shaw, Battle (£440).

Holmfirth.—REDUCTIONS IN TARIFFS.—The Urban District Council has approved the following reduced scale of charges for electricity:—Domestic supplies: Lighting, 6½d. per kWh; heating, 1½d.; rateable value tariff, 15 per cent. of the rateable value, plus ¾d. per kWh. Shops, hotels, and combined shops and houses: Lighting, 6½d.; heating, 1d.; rateable value tariff, 15 per cent. of the rateable value, plus ¾d. per kWh. Churches, clubs, offices, garages, &c.: Lighting, 5d.; heating, 1d. Small power consumers: First 200 kWh per quarter, 3d.; next 1,200 kWh, 2d.; next 2,000 kWh, 1½d.; beyond this quantity by special agreement. All the above charges are subject to 5 per cent. discount for prompt payment. Large power consumers: Maximum demand tariff with a sliding scale discount according to load factor.

CONTINUED PROGRESS.—The domestic load of the undertaking has doubled during the past three years, and the number of consumers is now 2,000. Over 1,500 appliances are on hire.

Ipswich.—OVERHEAD LINES.—The Electricity Committee is to erect an overhead line to Great Bealings at an estimated cost of £600.

Largs (Ayrshire).—ILLUMINATION SCHEME.—The Town Council has adopted a permanent scheme of illumination for future summer seasons, costing between £3,000 and £5,000 for the purchase of equipment. The illuminations will be in operation for a period of six weeks during August and September.

Linlithgow.—A RATING QUESTION.—At a recent meeting of the Town Council a letter was read from the assessor with reference to his practice of adding five per cent. to the valuation of premises in the town where electricity had been installed. He pointed out that this arrangement had been reached with the Town Council nine or ten years ago and there had been no reason for making any alteration. A discussion followed, and it was claimed that it was not a case of enhancing the value of the property by installing electric lighting, but purely a question of getting better lighting than that provided by the gas which was supplied in the town. A magistrate said that the assessor himself had installed electric lighting in Edinburgh and the Edinburgh assessor had charged him for doing so. It was stated that there was no similar charge in the neighbouring towns of Falkirk and

Grangemonth. Representations are to be made to the assessor on the matter.

London.—BATTERSEA.—The Electricity Committee proposes to provide services to 197 premises at an estimated cost of £1,882. Sanction is to be sought to borrow £40,000 for mains and services.

ST. PANCRAS.—The Electricity and Public Lighting Committee proposes to extend mains at a cost of £284 and erect and equip a sub-station in Malet Place at a cost of £1,050.

FULHAM.—The Electricity Committee has received sanction to the borrowing of £20,000 in connection with the rental wiring scheme.

HAMMERSMITH.—The Borough Council is recommended to provide wiring installations in 112 flats to be erected by the London County Council on its Wormholt Estate.

Switchgear is to be replaced at the Letchfield Gardens sub-station at an estimated cost of £200.

The following reductions in charges to large power consumers are proposed:—28,000 to 200,000 kWh per annum for combined lighting and power purposes, 1d. per kWh; over 200,000 kWh, 0.8d. per kWh on total consumption; 500,000 kWh and over (lighting not to exceed 20 per cent. of total), a fixed charge of £4 per kW of the maximum demand per annum, with a "unit" charge of 0.45d. The above charges are subject to a coal clause.

STOKE NEWINGTON.—In place of a previous scheme the Electricity Committee recommends the extension of the a.c. supply system to Green Lanes and Woodberry Grove at an estimated cost of £4,400.

Free wiring is to be carried out at a cost of £630.

Louth.—ELECTRICITY CHARGES.—The Town Council last week rejected a motion to instruct the Electricity Committee to take immediate steps to reduce the flat rate for lighting from 8d. to 6d. per kWh, the Committee viewing the motion as a reflection on it. A further motion that the Committee should reconsider the existing all-in tariff of 16s. per room plus 1d. per kWh, and submit a fresh basis which would remove existing anomalies, was agreed to.

Lowestoft.—THE USE OF SMALL MOTORS.—Persons using electric cookers are to be allowed to run small motors of not more than one h.p. on the same circuit as the cookers.

Musselburgh.—FREE WIRING FOR HOUSING SCHEME.—The Musselburgh and District Electric Light and Traction Co., Ltd., is to provide free wiring for tenants on the Town Council's Campie Gardens Estate.

Pontardawe (Swansea).—INAUGURATION OF SUPPLY.—The electricity supply scheme reached its final stage last Saturday, when Councillor T. Jeremiah, chairman of the Council, and Councillor John Arnold, chairman of the Electricity Committee, switched on the a.c. supply to the Council's sub-stations at Clydach, Eldis and Pontardawe. Supplies in bulk have been arranged by the South Wales Power Co., and the conversion of the system from d.c. to a.c. has involved an outlay of nearly £40,000. The contract for the work was undertaken by Messrs. W. T. Henley's Telegraph Works Co., Ltd. The ceremony of switching over was witnessed by representatives of the Council, the Power Co., and the contractors.

Rugby.—FURTHER POWERS SOUGHT.—The Town Council is to promote a Bill in Parliament seeking among other things further powers with regard to the electricity undertaking.

Seahouses.—ELECTRICITY UNDERTAKING SOLD.—Seahouses and District Electric Supply Co., Ltd., has sold its undertaking to the North-Eastern Electric Supply Co., at a price reported to be £2,350.

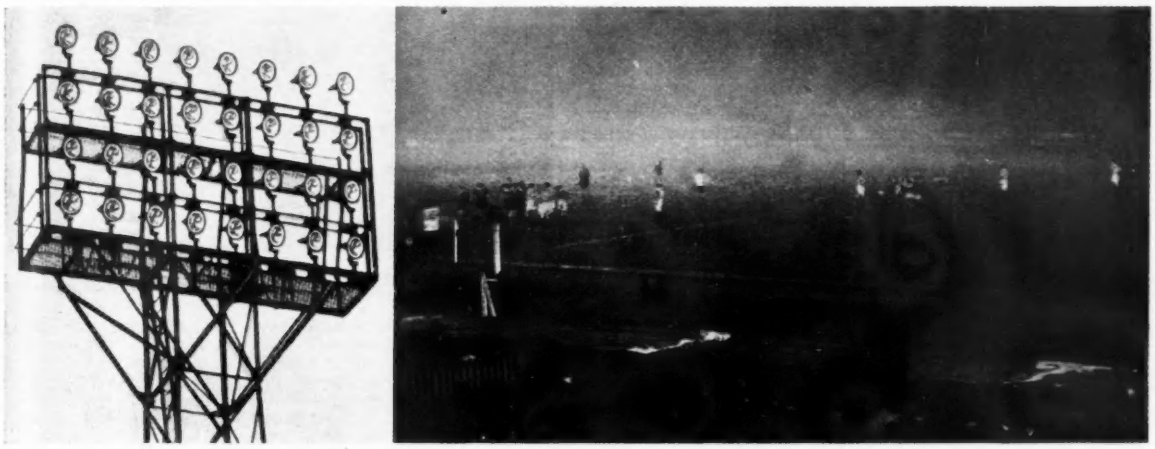
Stockton-on-Tees.—MAINS AND SERVICES.—The Electricity Committee has received sanction to the borrowing of £10,000 for mains and services. Arrangements have been made for services to be provided in old and new streets at a cost of £5,000.

Sunderland.—MAINS EXTENSIONS.—A scheme of mains extensions costing £1,753 has been approved by the Town Council.

Thurso.—WICK COUNCIL'S OFFER.—The terms of Wick Corporation to supply Thurso with electricity have been received by the Town Council. Wick offers to provide an 11,000-V sub-station at Thurso, and to bear the immediate cost of lines and sub-station, leaving the Thurso Council with the responsibility of supplying the town. Thurso is asked to guarantee a payment of £750 per annum for five years, and a further penny per kWh consumed. Alternately Wick is prepared to supply direct from Wick station and carry out all distribution, including services, at the prevailing tariff in Wick, provided that all street lamps are reconditioned for electricity and Thurso Council agrees to pay £300 per annum for street lighting. A special meeting of the Thurso Council is to be held to consider the matter.

Tonbridge.—E.H.P. MAINS.—The Urban District Council has received sanction to the borrowing of £9,105 for e.h.p. mains.

Tredegar.—SUPPLY ARRANGEMENTS.—Mr. Ivor David, consulting electrical engineer, has supplied the Urban District Council with a preliminary report with regard to the proposed supply of electricity by the South Wales Power Co. The report outlines a plan providing for mains covering the whole of the urban area with the exception of Trevil, Tafarnaubach, and Troedrhiwgwir, which places already have a supply. It is understood that the power company can bring its mains to Tredegar in six to seven months from the date of signing an agreement. Estimates of the scheme are to be prepared.



On Wednesday last week a demonstration was given at the White City Stadium, London, of Rugby football under flood-lighting conditions. The field is lighted from four towers (left-hand picture) 110 feet high and carrying thirty-two 1,000-W "Philiflood" projectors fitted with crystal silvered reflectors

Wallsend-on-Tyne.—CABLE EXTENSIONS.—The Town Council has approved plans submitted by the North-Eastern Electric Supply Co., Ltd., for l.p. distribution cables in Reid Avenue, Prospect Avenue, Fitzsimmons Avenue, and Mills Gardens to supply the Council houses.

Wealdstone.—LIGHTING OF THE COUNCIL HOUSES.—The Housing Committee has decided to obtain tenders for the installation of electric lighting at 316 Council houses on the Weald Estate and elsewhere.

Wednesbury.—COUNCIL CONSENTS TO DRAFT ORDER.—The Town Council has given its consent to a new Draft Order being applied for by the Midland Electric Corporation for Power Distribution, Ltd., for permission to supply electricity to the town.

Whitby.—PUBLIC LIGHTING.—The Rural District Council has been requested by Hinderwell Parish Council to arrange terms with the North Eastern Electric Supply Co., Ltd., for public lighting in the four villages comprising the parish of Hinderwell.

Willington (Co. Durham).—SUPPLY PROPOSAL.—Referring to the Council's proposal to take electricity from Messrs. Straker and Love, colliery owners, with a view to supplying the Dene Housing Estate, the Urban District Council has received a letter from the Electricity Commissioners stating that they would be glad to learn under what authority the Council proposed to give the supply itself. The Council has informed the Commissioners that it was not dissatisfied with the present supply, but with the conditions of installation and the price.

Worthing.—TENDERS TO BE INVITED.—Three new electric pumps with some smaller apparatus are to be installed at the Eastern outfall, and to supply these a new 11,000-V cable and a 250-kVA transformer, with switchgear and a sub-station building will be necessary, costing approximately £2,300. The borough electrical engineer has been instructed to prepare plans and invite tenders.

A NEW SUB-STATION.—The Electricity Committee is to apply for sanction to a loan of £3,530 for the erection and equipment of a sub-station at Canterbury Road.

Traction

Erith.—YEAR'S WORKING.—The Urban District Council's tramway undertaking shows a net loss of £6,080 for last year.

India.—NEW TRAMS FOR MADRAS.—The Madras Electric Tramways, Ltd., has decided to provide new rolling stock and for this purpose the authorised capital has been increased from £200,000 to £300,000. Some of the cars now being employed have been in service for a number of years and the present time is considered opportune for replacing these by more up-to-date vehicles. The old cross-bench cars, which at one time were common in India and other tropical countries, are now almost obsolete, having been superseded by cars of the corridor type. The cost of replacement of thirty-four cars is estimated at £65,000.

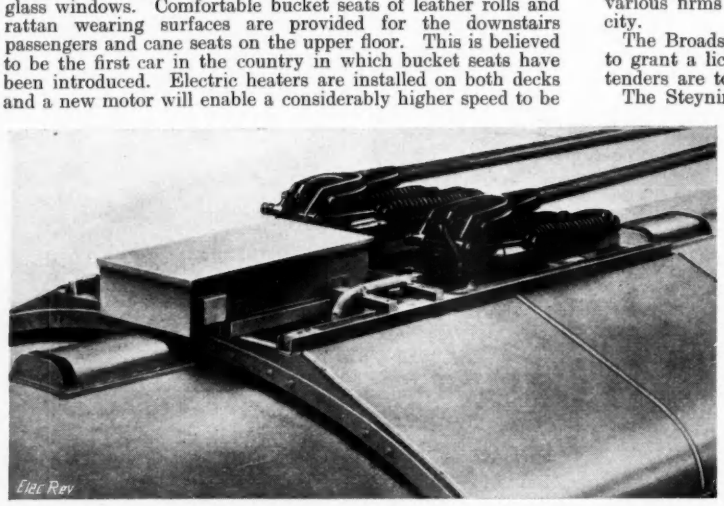
Leigh.—TROLLEY-BUSES.—Within the next few months the South Lancashire Transport Co. proposes to substitute trolley-buses for trams on the Lowton route.

New Zealand.—WELLINGTON.—The general manager of the city tramway undertaking, Mr. M. Cable, has sent us his annual report for the year ended March 31st, 1932. The revenue amounted to £393,194 (£453,676 in 1931), and the working expenses to £298,483 (£355,360), while the net loss increased from £3,488 in 1931 to £9,683. The number of passengers carried decreased from 44,286,509 to 38,278,552, and the car mileage from 4,395,335 to 4,130,110.

Ossett.—BUSES TO REPLACE TRAMS.—An agreement has been reached between the Dewsbury and Ossett Corporations and the National Electric Construction Co., Ltd., for the substitution of omnibuses for trams on the Dewsbury-Ossett route. The change-over will be made in August or September next, and it is understood that the tramway company has agreed to absorb as many of the tramway employés as possible in the new undertaking.

South Africa.—PRETORIA TRAMWAYS REORGANISATION.—The Trading Committee of the Pretoria Town Council is considering a reorganisation scheme for quicker and cheaper services. It is proposed to restore the 15-minute service, to reduce the tariff to 2d. a stage for cash or coupon, to have penny stages to different centres, and to re-open certain services which have been abandoned. The scheme would restore full time working for all men in the Tramway Department.

South Shields.—A MODERNISED TRAMCAR.—A new modern tramcar built by the Tramways Department under the supervision of Mr. J. Austin Baker, general manager, is to be put into service shortly. The car is a reconstructed one having been bought for £100 and rebuilt at a cost of £370. It has straight sides, a domed roof, rounded ends, and curved plate glass windows. Comfortable bucket seats of leather rolls and rattan wearing surfaces are provided for the downstairs passengers and cane seats on the upper floor. This is believed to be the first car in the country in which bucket seats have been introduced. Electric heaters are installed on both decks and a new motor will enable a considerably higher speed to be attained. Its trial trip will probably be run on January 9th. An article on "Modernising the Tramcar" was contributed by Mr. Baker to our issue of July 22nd last (p. 119).



Examples of special choke coils produced by the English Electric Co., Ltd., for preventing radio interference from trolley-buses. Two of the coils are mounted on the roof of each bus, connected in the circuit of the two trolley arms. Their weight is only 34 lb. and that of their casing, cast aluminium or wood, 17½ lb.

Communications

Chile.—WIRELESS TELEPHONY.—The capitals of Chile and Peru have been linked by wireless telephone and there was a cordial exchange of courtesies between the presidents of the two nations in Santiago and Lima respectively. This new line will also be used for communication with Brazil and Ecuador. —*Reuter* (Santiago de Chile).

China.—AUTOMATIC TELEPHONY.—A contract has recently been placed for the establishment of an automatic telephone exchange in the town of Changsha, in the Province of Hunan.

Crosby-on-Eden (Cumberland).—NEW TELEPHONE EXCHANGES.—A new automatic telephone exchange has been opened, being the third in the Carlisle district. A fourth is contemplated at Raughtonhead.

Droitwich.—NEW B.B.C. STATION.—Wychbold, near Droitwich in Worcestershire, has been chosen as the site of the new B.B.C. transmitting station which is to replace the Daventry (5XX) long-wave and Midland Regional transmitters. Some of the contracts have been placed and the plant will be completed within eighteen months. The new station will use a medium wave with a power of 70 kW and a long wave with a power of 100 kW.

Great Britain.—RADIO LICENCES.—The number of broadcast radio receiving licences issued in November was 72,949, making the total issued 5,123,183.

RADIO RELAY EXCHANGES.—The Acton Corporation has been asked to give P. Barratt (Motors), Ltd., Cheam Road, Sutton, Surrey, sole permission to operate a wireless relay service. The town clerk has informed the company that the borough is already served adequately in this respect.

Two of the new B.B.C. governors: Lord Bridgeman and Mrs. M. A. Hamilton

The Boston Town Council has refused permission for the establishment of a relay service for the town, the objection being to the use of overhead wires.

The Great Yarmouth Town Council has appointed a sub-committee to consider applications for permission to install a relay service.

The Salisbury City Council has refused applications from various firms for permission to establish relay services in the city.

The Broadstairs and St. Peter's Urban Council has decided to grant a licence for five years for a relay service for which tenders are to be invited.

The Steyning West Rural Council has given permission to the Worthing Wireless Relay Service to establish a service at Lancing.

The Douglas (I.O.M.) Corporation Works Committee has refused the application made by the Manxland Wireless Relay Service for permission to operate a relay service in the borough.

Holland.—RADIO RELAY EXCHANGES.—The number of wireless listeners in Holland at the end of September, 1932, was 554,778. Of this number 294,814 had their own receiving sets, says *World-Radio*, and 259,964 were connected to local wireless exchanges.

Norway.—NEW RADIO SERVICE.—A wireless communication service has recently been established between Norway and Torgilsbu, in Eastern Greenland.

Russia.—NEW RADIO STATIONS.—The Soviet Government, it is stated, intends to erect three new broadcasting stations in Asia. One of them will be at Vladivostock.—*Reuter* (Helsingfors).

Spain.—THE AMERICAN TELEPHONE MONOPOLY.—Threats to friendly commercial relations between Spain and the United States have disappeared following the withdrawal of the proposal before the Cortes to cancel the concession granted to the National Telephone Company of Spain. The proposal to cancel the concession was put forward in the first place on the ground that the concession, which was granted during the Monarchy, was "illegal." Under the terms of the contract, should the Spanish Government decide to take over the company, which is a subsidiary of the International Telephone and Telegraph Company, it may do so only upon payment of the sum invested in it, estimated to be at present in the neighbourhood of 1,000,000,000 pesetas (£25,000,000 at present rates). When the Spanish Republican Government announced its intention of cancelling the concession the United States Ambassador in Madrid made a strong protest and the matter has now been settled by the withdrawal of the cancellation proposal.—*Reuter* (Madrid).

Switzerland.—RADIO LICENCES.—In twelve months the number of licensed radio listeners has increased by 75,252. The total reached 208,234 on October 31st, 1932.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Ashford.—January 16th. Electricity Department. 33-kV transmission line. (See this issue.)

Australia.—MELBOURNE.—January 24th. Post and Telegraph Department. Resistances and reactances. (A. 11596.)*
January 3rd. Vitreous enamelled carbon resistances. (A.X. 11628.)*
January 17th. Automatic telephone relay sets. (A. 11618.)*
January 31st. Telephone registers and induction coils. (A. 11619.)*

Bolton.—January 4th. Housing Department. Electrical installations in 416 houses and flats and five shops on the Johnson Fold Estate. (See this issue.)

Cupar (Fife).—January 6th. Fife District Asylum. Various materials, including electrical fittings. Resident clerk of works.

Dundee.—January 6th. Public Health Department. Wireless installation at Ashludie Sanatorium, Monifieth. Town clerk.

Egypt.—CAIRO.—February 7th. Ministry of the Interior. Power station of about 660-kVA capacity. (A.X. 11599.)*
January 9th. Electric lighting of new bridge at Benha. (A.X. 11639.)*
SUEZ.—January 21st. Suez Local Commission. Underground armoured cables. (A.X. 11640.)*

Fareham.—Electricity Department. 100-kVA 11,000-V three-phase transformer. (December 16th.)

Galloway.—January 12th. Galloway Water Power Co. Construction of Glenlee power station (foundations and steelwork). Sir Alexander Gibb & Partners, Queen Anne's Lodge, Westminster, S.W.1 (fee of £10 10s.).

Halifax.—January 7th. Improvements Committee. Electricians' work for King Cross development. Mr. D. T. Lloyd Jones, borough engineer, Crossley Street (deposit £2 2s.).

Hull.—January 17th. Electricity Department. Two 200-Ah stationary batteries, charging equipment, switchgear, &c. (See this issue.)
Telephone Committee. Telephone cable and loading coils. (December 9th.)

Isle of Man.—January 9th. Electricity Board. 33-kV transmission lines and pole-mounted switchgear. (December 16th.)

Lochore (Fife).—January 6th. Miners' Welfare Fund Committee. Various works, including electric lighting installation, at Miners' Welfare Institute. Mr. J. W. Anderson, 8, New Row, Dunfermline.

London.—ISLINGTON.—January 20th. Electricity Department. Electrical and engineers' stores. (December 16th.)

New Zealand.—WELLINGTON.—February 7th. Post and Telegraph Department. 800 bell receivers and 5,000 mouthpieces. (A.X. 11627.)* 600 keys and 200 lamp caps. (A. 11626.)*
AUCKLAND.—January 16th. Electric Power Board. Negative traction booster. (A.X. 11623.)*

Salford.—December 30th. Electricity Department. H.p. automatic voltage regulating equipment. (December 16th.)

South Africa.—CAPETOWN.—January 18th. Electricity Department. Refrigerating plant for municipal abattoir, Maitland. (A.X. 11637.)*

Swansea.—January 19th. Electricity Department. Condensing plant for Tir John North power station. (December 16th.)

Thorne.—January 10th. West Riding County Council. Installation of electric lighting at additions to Boys' Council School. Education officer, County Hall, Wakefield.

Walton-upon-Thames.—January 9th. Urban District Council. Transformer kiosk, switchgear, fuse units and cables. (December 16th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Burton-on-Trent.—Electricity Committee. Accepted. Oil purifier (£111).—Hopkinsons, Ltd.

Chesterfield.—Electricity Committee. Accepted. Spare transformer (£113).—British Thomson-Houston Co., Ltd.

Croydon.—Electricity Committee. Accepted. Renewal of battery plates (£133).—Britannia Batteries, Ltd. Two feeder switches and two transformer switches (£711).—A. Reyrolle & Co., Ltd. One 250-kVA transformer (£162).—British Electric Transformer Co., Ltd.

Douglas (I.o.M.).—Electricity Committee. Accepted. Transformers (£417).—Bruce Peebles & Co., Ltd. Switchgear (£1,592).—New Switchgear Co.

Government Contracts.—The following contracts were placed by the various Government Departments during November :—

ADMIRALTY (CONTRACT & PURCHASE DEPARTMENT).
Amplifiers, tuners and range coils.—Radio Instruments, Ltd.
Electric cable.—G.E.C.; Henley's.
Inert cells.—G.E.C.
Electrodes.—Murex Welding Processes.
Wireless valves.—Mullard Radio Valve Co.
Wavemeters, slow motion dials, &c.—H. W. Sullivan; Marconi's; Radio Instruments.

WAR OFFICE.
Electrically driven circular saws.—Modern Woodworking Machines, Ltd.

CROWN AGENTS FOR THE COLONIES.
Electrical equipment.—Crossley Bros.
Generating plant.—Belliss & Morcom.
Poles.—Siemens Bros.
Telephones.—G.E.C.
Telephone switchboards.—Ericsson Telephones.
Wire.—Siemens Electric Lamps and Supplies.

POST OFFICE.
Telephonic apparatus.—Automatic Electric Co.; G.E.C.; Phœnix Telephone & Electric Works; Plessey Co.; Standard Telephones & Cables; Telephone Mfg. Co.
Testing and protective apparatus.—Phœnix Telephone and Elec. Works.
Wireless apparatus.—Pye Radio.
Electric bulbs.—A. C. Cossor.
Cables.—B.I. Cables; Connollys (Blackley); Hackbridge Cable Co.; Henley's; Pirelli-General Cable Works.
Loading coils.—G.E.C.; Standard Telephones & Cables.
Condensers.—Muirhead & Co.
Telephone cords.—Standard Telephones & Cables.
Electric lighting fittings.—Revo Electric Co.
Meters.—Chamberlain & Hookham.
Rectifiers.—Ediswan.
Thermionic valves.—G.E.C.
Copper wire.—Enfield Cable Works.
Flameproof wire.—G.E.C.
Electrically driven compressor set for pneumatic tubes, Glasgow head post office.—G. & J. Weir.
Telephone exchange equipment.—London trunk exchange: Standard Telephones & Cables. Whitton (Ipswich area); Birmingham trunk exchange; Manchester; Chelston (Torquay area): Automatic Electric Co. Macaulay (London area); Erdington (Birmingham area): G.E.C. Shepherd's Bush; Larkswood (London area): Ericsson Telephones. Sub-contractors for Larkswood: Pritchett & Gold & E.P.S. Co. for batteries; Electric Construction Co. for motor generator and ringing machines. Stamford Hill (London area): Ericsson Telephones. Sub-contractors: Chloride Electric Storage Co. for batteries; Electric Construction Co. for motor generator and ringing machines.
Telephonic repeater equipment, Manchester.—Standard Telephones & Cables.

H.M. OFFICE OF WORKS.
Wiring of Burlington House, W.—Haine & Co.

Ipswich.—Health Committee. Accepted. Batteries for two electric vehicles (£114 each).—Chloride Electrical Storage Co., Ltd.
Electricity Committee. Accepted. Extension of ash conveyor plant (£265).—Messrs. Cocksedge & Co., Ltd.

London.—SOUTHWARK.—Electricity Committee. Recommended. Meters for twelve months.—Chamberlain & Hookham, Ltd.; Measurement, Ltd. Cables for twelve months.—Connollys, Ltd. Feeder pillar.—Derby Cables, Ltd.
ISLINGTON.—Works Committee. Recommended. Batteries for six electric vehicles (£715).—Britannia Batteries, Ltd.
HAMMERSMITH. — Electricity Committee. Recommended. Cable (£561).—Pirelli-General Cable Works, Ltd. Meter-testing equipment (£115).—Landis & Gyr, Ltd.
ST. PANCRAS.—Contracts and Stores Committee. Recommended. Cable.—Edison Swan Cables, Ltd. (£33); Metropolitan Electric Cable & Construction Co., Ltd. (£815). Air-washing plant (£745).—Sturtevant Engineering Co., Ltd. Temporary transforming equipment, Crown Estate (£148).—English Electric Co., Ltd.
STEPNEY.—Electricity Supply Committee. Recommended. Four ammeters, shunts and voltmeters (£58).—Weston Electrical Instrument Co., Ltd. Neutral panels for Whitechapel sub-station (£168).—Electric Construction Co., Ltd. Disconnecting boxes (£81).—G. P. Cosway, Ltd.

Macclesfield.—Rural District Council. Accepted. Installation of electric lighting in six houses at Chelford (£75).—W. Newman.

Worthing.—Electricity Committee. Accepted. Equipment of sub-station at Canterbury Road (£900).—Crompton Parkinson, Ltd.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following :—

GODWIN lamp.
B.c. adaptor incorporating a 2-A fuse.
Small thermostats suitable for electric pads.
CLANG bakelite push bar switch.

The London and Home Counties J.E.A.

The London and Home Counties Electricity District (Amendment) Order, 1932, has been published (Stationery Office, 9d. net). Its provisions include the extension of the area prescribed in the Order of 1925 so as to take in the parishes of Abinger, Capel, Newdigate, Ockley, and Wotton, in the Dorking Rural District, and the parish of Leigh in the Reigate Rural District; the taking over of the purchase rights of local authorities in the Mid-Surrey district regarding certain areas; and arrangements for the representation of these authorities on the J.E.A.

Notes

E.P.E.A. Cardiff Dinner

That within the next ten years South Wales, besides exporting coal, would be a great exporting centre for the electricity generated in super-power stations in the coal field was the prophecy of Mr. C. T. Allan, assistant manager to the South Wales Electric Power Co., speaking at the annual dinner of the Western Division of the Electrical Power Engineers' Association at Cardiff on Saturday. Responding to the toast of "The Electricity Supply Industry," Mr. Allan reminded the company that, in spite of the trade depression during the year 1931, the increased consumption of electricity in England and Wales had amounted to 537,000,000 kWh, equivalent to a 5 per cent. advance. There had been a great advance in the electrification of the home, 600,000 houses having been electrified during the year, bringing the total to 4,000,000. That was probably only 20 per cent. of the homes which could be electrified, and if they took as a basis (as it would be when prices came down) that each home would take three kilowatts, and that 20,000,000 homes were electrified, it would mean more power stations to handle the load.

Mr. C. G. Morley New, City electrical engineer, Cardiff, in proposing the toast of "The Association," said he was just a little troubled by the amount of success that the electricity supply industry had met with. In municipal areas, where both gas and electric power systems were municipally owned, there seemed to be a movement to put a brake on the electrical undertaking in order to save the gas undertaking. The best possible arrangement was to have the two competing industries in different hands, each side striving the give the best service to the community. Mr. H. G. Taylor (Glasgow), in responding, referred to Mr. Allan's prophecy, and said that in that connection they had to remember the schemes for the production of electricity generated from water power which were under consideration in the Grampians and which would make Scotland a great supply centre.

Newcastle Contractors' Dinner

The annual dinner of the Newcastle branch of the Electrical Contractors' Association was held at Newcastle on December 15th, Mr. E. W. Andrews, of Sunderland, the local chairman, presiding. Those present included the Lord Mayor of Newcastle (Ald. J. W. Leech, M.P.), the Sheriff (Ald. J. W. Telford), and the president of the Association, Mr. W. B. Williams, of Bristol. Proposing the toast of "The Association," the Lord Mayor congratulated the Association on the progress made in recent years. In replying, Mr. Williams referred to the work of the Association, and asserted that had it not been for the work of the E.C.A., electrical contracting would have been chaotic. Their Association was in no sense a trade ring; it was only concerned with seeing that its members played the game, fulfilled their obligations and, above all, carried out good work. He mentioned two Newcastle men—Messrs. W. Cross and R. Robson—who, he said, had done good work for the Association as presidents. Mr. Andrews, the local chairman, proposed "The Guests."

A Memorial to Dr. Ferranti

The workpeople and staff of Ferranti, Ltd., on Friday presented a cheque for £1,000 to the Oldham Royal Infirmary for the purpose of endowing a bed in the memory of the late Dr. S. Z. de Ferranti. Mr. W. Tyldesley, secretary of Ferranti, Ltd., said that they felt that they could not have chosen a better way than that to commemorate the memory of a great man, and an ideal employer, one who always sought to engage on useful work as many employés as possible. The cheque they were handing over that day would bring the total subscriptions from Ferranti's works to Oldham Royal Infirmary and other similar institutions to over £7,000.

New Coaling Facilities

Mr. H. P. Everett, chairman of the Tyne Improvement Commission, put into operation last Friday modern coal shipping staithes at the Northumberland Docks, Howdon-on-Tyne. There are two "shoots," which load coal together at the rate of 1,000 tons per hour. The staithes are controlled throughout by electricity, and one man, it is stated, can supervise the loading of a ship. They have cost £120,000 to build and will be used principally by Hartley Main Collieries, Ltd.

Appointments Vacant

Engineer to take charge of switchgear, transformer, and instrument manufacturing departments for Messrs. Johnson & Phillips, Ltd.

District mains assistant for Walsall Electricity Supply Department.

(See our classified advertisements to-day.)

Standard Tubular Steel Poles

B.S.S. No. 471-1932 for extra light tubular steel poles for telegraph and telephone purposes is virtually a supplement to Specification No. 134, which was issued a few years ago and dealt with longer and stronger poles than those now covered. The new specification is for poles which are intended primarily for use in sparsely populated regions and where cheapness in first cost and lightness (to reduce transport charges) are the essential factors. This type of pole has been extensively used in South Africa for many years, and the specification used by the Department of Posts and Telegraphs, South Africa, was largely taken as a basis for the B.S. specification. Each pole consists of a cast-iron base and a steel upper tube, the joint between them being made by means of a wedge. The pole is completed by the addition of a cap which may, if desired, be provided with a lightning rod. The dimensions of each component are specified and tests for the strength of the pole are included. Copies of this specification (No. 471-1932), may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

The E.A.W.

Twenty electrical appliances, such as electric fires, toasters, irons, and hair-curlers, were given by local and national firms as prizes at the third annual dance of the Bradford and District Branch of the Electrical Association for Women, which was held on December 15th. The Lord Mayor of Bradford (Alderman J. W. Longley), who is himself an electrical and mechanical engineer, attended with the Lady Mayoress (Mrs. Longley), who presented the prizes. Others among the 400 present were Mrs. Carruthers (chairman of the branch) and Miss Eva Moss, who as branch hon. secretary organised this very successful event. Mr. Harry Moss, chairman of the Bradford branch of the Electrical Contractors' Association, was one of the M.C.s.

At the invitation of the Mayor and Corporation of Torquay a "South-Western Conference" of the Association is to be held in Torquay on February 22nd, 23rd, and 24th. The speakers will probably include Sir John and Lady Brook, Lady Mount Temple (immediate past-president of the E.A.W.), Sir Hugo Hirst, and Miss Caroline Haslett (director of the E.A.W.). The conference secretary is Miss Parr, Nethway, Falkland Road, Torquay, S. Devon.

Standard Specification for Flame-proof Plugs and Sockets

The British Standards Institution's Specification No. 279, which relates to heavy-duty 660-V flameproof plugs and sockets primarily for use in mines, was first published over five years ago, its main objects being to standardise the dimensions essential to secure interchangeability between plugs of different makes, without in any way impairing the flameproofness of the apparatus. A revised specification follows very largely the same lines as the earlier edition, but takes account of modifications in practice introduced during the intervening five years, and endeavours to make it easy for the designers and builders of machines on which flameproof plugs and sockets made in accordance with it have to be used to ensure that there will be no difficulty in securing "physical interchangeability of plugs of different makes." Electrical interlocking has now been definitely mentioned in the title of the specification, and, generally, the provisions for interlocking the plug with its associated apparatus have been made clearer by being collected together into one clause, amplified by an appendix on the interchangeability of the interlocking pin and socket. Very special care has been given to the drawings in the new specification, in the hope that they will give increased clearness of guidance, and the provisions relating to the cable-gland have been modified in such a way as to help the designer to avoid any fouling between the gland and his apparatus. Copies of the specification (No. 279-1932) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

I.E.E. (Western Centre)

The annual dinner of the Western Centre of the I.E.E. will be held on January 9th at the Berkeley Café, Queen's Road, Bristol.

A Rotary h.p. Boiler

A description appears in *V.D.I. Zeitschrift* of a boiler with an output of 4,000 lb. per hour that revolves with its associated turbine at 3,000 r.p.m., dispensing with feed pumps and fans; steam conditions are 1,700 lb. per sq. in. absolute, and 700 deg. F. Steam is expanded in the turbine to 355 lb. per sq. in. absolute, when it is reheated to 840 deg. F. The heating surfaces are: evaporator, 710 sq. ft.; h.p. superheater 21.5 sq. ft.; and reheater 376 sq. ft. The output of the turbine is 850 kW, from which must be deducted 200 kW for rotating the boiler. The principle is that the centrifugal action of water overcomes that of steam by an amount equivalent to the steam pressure, which varies with the r.p.m.

The condensate returns to the boiler at low pressure in an amount depending on the evaporation. At speeds of 1,500 r.p.m. a heat transmission of 52 B.th.u. per sq. ft. per hour per deg. F. difference has been obtained; this is expected to improve at higher speeds, so that the boiler will operate on a heating area of about one-fifth of that of the normal boiler. It is estimated that this design will enable a saving of 60 per cent. to be effected in the capital cost of the boiler.

Cleaning CO_2 Recorders

The carborundum filters fitted to some CO_2 recorders will clog after some use, and they should be cleaned by compressed air. A valve should be arranged so that the filter can be disconnected from the instrument, and a connection made so that compressed air can be passed through the filter in the reverse direction to that of the gases. The air should be at a pressure of between 10 and 15 lb. per sq. in. This will quickly remove any dirt which has collected.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. H. T. Tizard, Rector of the Imperial College of Science and Technology, has been appointed to the position of chairman of the Aeronautical Research Committee.

Mr. J. P. Tucker, A.M.I.E.E., sales engineer with the Yorkshire Electric Power Co., at Leeds, has been appointed as the first engineer and manager to the Isle of Man Electricity Board. Mr. Tucker was apprenticed to electrical engineering at Torquay in 1910, and after the war spent three years at Loughborough Technical College. On leaving Loughborough he joined the Yorkshire Electric Power Co. as an operation engineer, and later was appointed a district engineer before becoming sales engineer. He has had a wide experience in electricity supply and has made a special study of street lighting. The Board was appointed by the Manx Government in October last and is now engaged in carrying out a survey of the chief routes proposed. It is hoped to place contracts in January.

Mr. J. P. Tucker

[*Elliott & Fry*

Dr. C. C. Garrard, who is giving the Students' Lecture on "Switchgear" at the various centres of the Institution of Electrical Engineers

Mr. C. Furness, borough electrical engineer, Blackpool, has been elected president of the Blackpool Association of Local Government Officers.

Dr. Irving Langmuir, associate director of the American General Electric research laboratory, is now in Europe. In Stockholm on December 10th, Dr. Langmuir was presented with the Nobel Prize for Chemistry. He is to visit several European laboratories and expects to return to Schenectady in the middle of February.

Col. Fritz Brase and **Mr. James Halpin** have resigned their positions on the Irish Free State Broadcasting Advisory Committee. The appointment of their successors is in the hands of the Minister of Posts and Telegraphs.

Sir Herbert Holt has, according to a *Reuter* message from Montreal, relinquished the presidency of the Montreal Light, Heat & Power Co., at the request of his medical advisers, but has assumed the chairmanship of the board of directors. **Mr. J. S. Norris** (vice-chairman) is the new president.

The many friends of **Mr. Reginald O. Kapp,** M.I.E.E., will join us in hearty good wishes to him and his wife as they leave to-day (Friday) for their honeymoon, which is to be spent on the Continent.

Mr. J. A. Worrall, on December 10th, was presented by Mr. E. Bussey, president of the Electrical Trades Union, with an illuminated address and gold medallion in recognition of an unbroken membership of the Union extending over forty years. Mr. Worrall is still an active member, and is employed in the overhead linesmen's section of the Sheffield Corporation Tramways.

New B.B.C. Governors.—The following appointments have been made to the Board of Governors of the British Broadcasting Corporation: Mr. R. C. Norman (to be vice-chairman), Viscount Bridgeman, and Mrs. M. A. Hamilton. The appointments are for a period of four years from January 1st next.

[*Wykeham Studios.*

Mr. F. C. Raphael, who opened the discussion on "House Wiring Simplification and Elaboration" at the I.E.E. meeting on Monday

Mr. A. A. Blackburn, tramways manager to Huddersfield Corporation, who is shortly due to retire on superannuation and in respect of whose post advertisements were recently issued for a successor, has agreed to continue duty pending the recovery from illness of Alderman Canby, chairman of the Tramways Committee. Advertisements of the post have accordingly been withdrawn for the present.

Mr. Frederick Gaby, chief engineer of the Hydro-Electric Power Commission of Ontario, Canada, has been elected a full member of the Overhead Lines Association, and **Mr. H. W. Grimmit,** who is on the staff of the Electricity Commission, has been elected a member of the Council.

Mr. W. B. Good has relinquished his connection with Messrs. Ernest Turner Electrical Instruments, Ltd., of High Wycombe.

Obituary

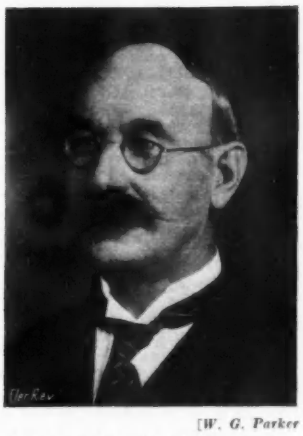
Mr. C. Magee.—We regret to learn of the death of Mr. Charles Magee, the Belfast branch manager of Messrs. W. T. Henley's Telegraph Works Co., Ltd., which occurred on December 15th at the age of 51. Mr. Magee had been in charge of the company's Belfast branch since September, 1924.

Mr. A. Garton.—The death occurred on December 1st, in his 67th year, of Mr. Alfred Garton, for many years head of the firm of George Garton and Son, electrical engineers, of Market Place, Huddersfield. He was a native of that town, and retired from the business twelve months ago.

Mr. W. Geddes.—The death has occurred at Aberdeen of Mr. Walter Geddes, inspector of the engineering department of the General Post Office, Aberdeen. Mr. Geddes, who was 48 years of age, entered the service thirty years ago.

Mr. J. Stedman.—The death occurred on December 4th, at the age of 77 years, of Mr. James Stedman, director of Harper and Stedman, Ltd., electrical engineers, of Cliffe, Lewes, Sussex.

Mr. W. C. Ullmann.—We record with regret that Mr. William Charles Ullman passed away suddenly at his home at Cheam, Surrey, on December 14th, at the age of 68 years. The funeral ceremony took place last Saturday at the Parish Church, Cheam. Mr. Ullman had been connected with the electrical industry here since the year 1889, and for twenty-six years he was directly interested in electric tramway matters until his retirement in 1924, since which year he had travelled a good deal for change and recreation. He did not commence his engineering career in this country for he entered the service of the South Australian Government Railway in 1881 as an engineering apprentice, becoming an inspecting engineer later. In 1889 he came to London as the resident engineer for the Brush Electrical Engineering Co., the contractors for the lighting of the City of London. Six years later, he returned to Australia to take up the appointment of chief engineer to the Sulphide Corporation, of New South Wales, but in 1898 joined the British Thomson-Houston Co. as resident engineer at Sheffield for the construction of the first sections of the Sheffield Corporation tramways, and in the following year was appointed engineer and manager of the East Ham Corporation Electricity and Tramways Departments. In the last-mentioned capacity, Mr. Ullmann designed and constructed the electric lighting and tramways undertakings for East Ham, the tramways being the first municipal undertaking of the kind in the Metropolis. Mr. Ullman was a member of the Institutions of Electrical and Mechanical Engineers, and of the Institute of Transport.



[*W. G. Parker*

The late Mr. W. C. Ullmann

Wills.—**Mr. C. H. Gray,** formerly chairman and latterly joint managing director of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., left £107,548 (net personalty £93,741).

The late **Mr. F. Dowson,** a director of Mather and Platt, Ltd., left £37,587 (net personalty £36,238).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Fraser & Chalmers (S.A.), Ltd.—Particulars filed on November 24th, pursuant to Section 344 of the Companies Act, 1929. Capital: £250,000 in 250,000 shares of 8s. each and 150,000 participating priority shares of £1 each. The company was incorporated in South Africa on December 20th, 1918, to acquire from W. H. Haig, C. E. Rogers and R. T. Smith, the business and assets of Fraser & Chalmers, Ltd., in South Africa, to assume the liabilities and obligations as at June 30th, 1918, and to carry on the business of engineers, contractors, suppliers of and dealers in railway, tramway and other apparatus, electrical engineers, suppliers of light, heat, sound and power, &c. The registered office is in Transvaal Province. British address: Adelaide House, King William Street, E.C., where G. T. Hannaford and F. J. R. Gorman are authorised to accept service of process and notices on behalf of the company.

Turner (Nu-Este), Ltd.—Private company. Registered December 14th. Capital, £4,500 in £1 shares (2,250 "A" ordinary and 2,250 "B" ordinary). Objects: To acquire an invention of a cleaning and polishing machine and all patents in connection therewith, to adopt two agreements with W. H. Turner, and to carry on the business of manufacturers and repairers of, agents for and dealers in electrical and mechanical contrivances for cleaning and polishing, &c. The directors are: W. H. Turner, 23, Ellesmere Road South, Chorlton-cum-Hardy, Manchester; and H. P. Addleshaw, Greystoke, Park Road, Bowden, Ches. Solicitors: Boote, Dutton & Whittaker, 12/16, Booth Street, Manchester.

Lightring, Ltd.—Private company. Registered December 14th. Capital, £600 in £1 shares. Objects: To carry on business as manufacturers of and dealers in light reflectors, prisms, and electrical apparatus of every description, engineers, &c. The subscribers are: Anne Woolley, 127, Elphinstone Road, Walthamstow, E.17; and Stella M. Bailey, 32, Surrey Road, Peckham Rye, S.E.15. Solicitors: S. Rutter & Co., 1/2, Great Winchester Street, E.C.2.

R. Seddon & Sons (Manchester), Ltd.—Private company. Registered December 17th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor heretofore carried on by Richard Seddon, trading as "R. Seddon & Sons," at 296, Ashton Road, Beswick, Manchester. The directors are: R. Seddon and May Seddon, both of Sunnyside, Seymour Avenue, Clayton, Manchester.

Radio Services (Bradford), Ltd.—Private company. Registered December 17th. Capital, £1,500 in £1 shares. Objects: To acquire the business of a radio service and repair depôt carried on by J. Ainsworth, J. W. Baildon, and G. A. Mawson, at 30, Whetley Hill, Bradford. The directors are: J. Ainsworth, 96, Whetley Hill, Bradford, and two others. Solicitor: R. C. Yablon, King's Arcade, Market Street, Bradford.

F. C. Hill & Co., Ltd.—Private company. Registered December 8th. Capital, £500 in £1 shares. Objects: To acquire the business of a wireless and electrical engineer carried on by F. C. Hill at Compton Road, Wolverhampton. The directors are: F. C. Hill, 154, Compton Road, E. T. Stark, 6, Merridale Grove, and Violet E. Tildesley, Wendon, Westland Road, all Wolverhampton. Secretary: J. W. Stirk. Registered office: Bilston Street, Wolverhampton.

Painton & Paull, Ltd.—Private company. Registered December 17th. Capital, £300 in £1 shares. Objects: To acquire all or any of the rights of P. R. Painton in an invention connected with telegraphic transmitting and receiving apparatus or other similar inventions, &c. The directors are: P. R. Painton, 25, Cavendish Avenue, Church End, Finchley, and H. P. Huhne, 24, Cecile Road, Enfield, Middlesex. Secretary: H. P. Huhne. Registered office: 24, Queensway, Ponders End, Middlesex.

J. C. M. Signs, Ltd.—Private company. Registered in Dublin on December 10th. Capital, £400 in £1 shares. Objects: To manufacture, hire, procure on the hire-purchase system or otherwise acquire all classes of signs and electrical goods, &c. The directors are: J. C. Moorkens, 75, Morehampton Road, Donnybrook, Dublin; and W. R. Lambert, 8, Northumberland Avenue, Dunlaoghaire.

Returns of Electrical Companies

Flinders (Wholesale), Ltd.—Particulars have been filed of debenture stock for £15,000 authorised November 23rd, and covered by trust deed of same date. No issue has yet been made. Property charged: Plant, chattels and effects at premises in Colchester, Norwich, Ipswich, Cambridge and Portsmouth (subject to the outstanding series of first mortgage debentures totalling £15,000), and the company's undertaking and other property, present and future, including uncalled capital. Trustees: Sir Basil E. Mayhew, K.B.E., and A. W. Welton.

British Pix Co., Ltd.—Satisfaction to the extent of £1,000 on November 9th, and to the extent of £1,300 on November 30th, 1932, of debenture dated July 5th, 1932, and registered July 7th, 1932.

Santon, Ltd.—Mortgage on freehold factory premises in Barthropp Street and Lloyd Street, Newport, Mon, dated November 21st, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £3,000.

Willet & Robinson, Ltd.—Particulars filed of £8,000 debentures authorised November 28th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Armature and Engineering Co., Ltd.—R. C. Pessell, consulting engineer, 50, Longfellow Avenue, Bath, was appointed receiver and manager on December 5th, under powers contained in instrument dated November 4th, 1932.

Harden Cartwright, Ltd.—Capital, £1,000 in £1 shares. Return dated November 18th, 1931 (filed August 6th, 1932). 460 shares taken up. £400 paid. £60 considered as paid. Mortgages and charges: £300.

Central Sussex Electricity, Ltd.—Capital, £30,000 in £1 shares. Return dated July 15th, 1932. All shares taken up. £30,000 paid. Mortgages and charges, nil.

Bastian & Allen, Ltd.—Debenture dated November 19th, 1932, to secure all moneys due and liabilities which now are or shall from time to time be due, owing or incurred by the company, to the chargees or for which the company may be or become liable to the chargees not exceeding at any time £5,000. Property charged: the company's undertaking and property, present and future, including uncalled capital. Holders: Candy Filter Company, Ltd., 14, Church Road, Hanwell.

General Electric Co., Ltd.—Satisfaction to the further extent of £44,850 on or before November 1st, 1932, of 5 per cent. mortgage debenture stock, authorised September 11th, 1930, secured by trust deed dated October 14th, 1930, and registered October 21st, 1930. (According to the register of mortgages, the trust deed registered October 21st, 1930, originally secured £3,500,000 debenture stock and contingent premium of 5 per cent.)

Southern Counties Radio, Ltd.—G. Steven, Kenwyn, Furze Lane, Purley, was appointed receiver and manager on November 30th, under powers contained in debentures dated September 16th, 1932.

William Beardmore & Co., Ltd.—Satisfaction to the extent of £35,211 on October 28th, 1932, of trust deed dated September 20th, 1929, and registered October 8th, 1929, securing £1,250,000 7 per cent. first mortgage debenture stock.

Hume Atkins & Co., Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £2,500.

Minehead Electric Supply Co., Ltd.—Capital, £85,000 in 16,000 1st preference, 8,000 2nd preference, and 61,000 ordinary shares of £1 each. Return dated June 10th, 1932. 16,000 1st preference, 8,000 2nd preference, and 51,000 ordinary shares taken up. £73,027 paid on 16,000 1st preference, 8,000 2nd preference, and 49,027 ordinary shares. £1,973 considered as paid on 1,973 ordinary shares. Mortgages and charges, nil.

Edison Swan Cables, Ltd.—Satisfaction to the extent of £250,000, on December 1st, of trust deed dated November 24th, 1927, and registered November 29th, 1927.

John Adams, Ltd.—Capital, £7,000 in 6,000 preference and 1,000 ordinary shares of £1 each. Return dated June 21st, 1932. 2,700 preference and 300 ordinary shares taken up. £3,000 paid. Mortgages and charges, nil.

Burch & Vertue, Ltd.—Debenture dated December 7th, to secure all moneys due or to become due from the company to F. Burch, 13, High Street, Aldershot, not exceeding £800. Property charged: Company's undertaking, property and assets, including uncalled capital.

North London Valve and B.U.R.T.S., Ltd.—Debenture dated December 1st to secure £5,000, charged on the company's property, present and future, including uncalled capital. Holder: C. E. Thomas, 125, Upper Clapton Road, E.5

Wireless Trading Association, Ltd.—Issue on December 1st of £1,750 debentures, part of a series already registered.

City Notes

Crompton Parkinson, Ltd., held their annual meeting on December 15th, Mr. E. C. Holroyde presiding in the absence of Mr. F. Parkinson (chairman), who was indisposed. Mr. Holroyde read the chairman's speech, which said that the total sales of the company's products showed a satisfactory increase over those in any previous trading year. The period of industrial depression experienced in recent years had caused a reduction in demand for certain classes of electrical machinery, and in some cases almost a cessation of orders, but their policy of continuously searching for new lines of manufacture had been successful in creating new sales which had more than offset any contraction in turnover in other directions. To meet the large demand that had been experienced for Crompton lamps, new works had been constructed. By virtue of their shareholding in the British Electric Transformer Co., Ltd., they now controlled the Kye lamp business, and, by co-ordinating the manufacturing resources and experience, considerable economies had been made possible to the benefit of both companies. Steps had been taken to continue and extend the research and technical development connected with the design and manufacture of electric lamps. A glass works had been built at Guiseley during the year for the production of all glass used in the manufacture of electric lamps. Since their last meeting they had acquired a controlling interest in the British Electric Transformer Co., Ltd., and when the reorganisation of that company had been completed, the prospects of converting it into a sound, profit-earning business were satisfactory. They had also acquired control during the year of Derby Cables, Ltd., which was making satisfactory profits. The published accounts did not include any income from either of these recent acquisitions. Considerable progress had been made in the electric traction department. They had now a number of equipments in operation on various railway and tramway systems, and with the return of more normal trading conditions they were justified in anticipating substantial developments in this department. The continued expansion of their business and the acquisition of new interests

necessitated the introduction of fresh capital. They had experienced no difficulty in obtaining temporary capital on attractive terms, but they felt it desirable to replace this by permanent capital corresponding to the permanent character of the assets acquired. They also felt that the steady growth of the undertaking and the increase in profits amply justified an addition to the preference capital of the company, and that an issue of this class of capital was most calculated to strengthen the position of the company and of all classes of shareholders at the present time. Mr. Holroyde then briefly outlined the proposals for new capital, particulars of which were published in our issue of December 9th, p. 871. These were to be submitted for approval at an extraordinary meeting yesterday (Thursday).

The Perak River Hydro-Electric Power Co., Ltd., held its annual meeting on December 15th. Mr. G. Balfour (chairman), who presided, in presenting the report and accounts (ELEC. REV., December 16th, p. 909), said that when they met last year they did not foresee the rapid decline in the demand for commodities, and in particular the demand for tin. In the circumstances they had come through last year as well as could be expected and fairly well up to their forecast, but he must warn them that the current year would be much worse. The tin-mining industry provided their principal load—93 per cent. of the total in 1931. They would therefore appreciate the serious effect of the progressive increase in restriction of output from March, 1931, to June, 1932. When they last met, in November, 1931, restriction had been increased to 60 per cent., but in June, 1932, a further restriction was imposed, raising the proportion to 75 per cent., and thus reducing the production allowed to only 25 per cent. of the 1929 output. The result was that the average permitted production for the year ended July 31st last was 41 per cent., compared with the average for the year 1930-31 of 89 per cent. The effect of the restrictions during the current year had already been serious, the drop in gross receipts being over 30 per cent. Arrangements were made some months ago for the supply of electricity to one of the largest tin-mining groups in Malaya operating within the company's concession area. Delay occurred, however, in quarters outside the control of either party, and it would not now be possible to connect this important consumer for a few months. They hoped to conclude agreements with other important prospective consumers, but the delay in completing the agreement already referred to had retarded negotiations. The total energy sold last year was 47,200,000 kWh, as compared with 58,500,000 kWh during the previous year, while the maximum load fell from 11,600 to 10,000 kW. The yearly application of £35,000 and accrued interest on redeemed stock was a serious burden in the present situation. With a relief for, say, three years from the depletion of their resources to the extent of £35,000 per annum, they should be able to provide for moderate capital requirements and strengthen the revenue of the company. This suggestion would require the approval of the interested parties, but it was so vital to their own interest that if such a proposal was made he felt that it would receive sympathetic consideration.

The Ceará Tramway Light & Power Co., Ltd., held its annual meeting on December 9th, when Mr. E. H. R. Trenow (chairman) in the course of his speech said that the results in sterling were the lowest since the earlier years of the company's operations; yet the gross takings in currency were the highest on record, with the exception of the two immediately preceding years. There was a substantial fall in the gross receipts from both trams and buses, but there was an absolute loss on omnibus operation due to the increase in opposition buses. There were, however, signs of an improvement in tramway receipts. The electrically propelled vehicle was the most economic form of traction for Ceará, and steps must be taken to improve and extend the electric vehicle services. This, however, involved expenditure upon track and rolling stock, and possibly an experimental service with railless electric vehicles. Necessity might arise for considering the conversion of the street lighting in Ceará from gas to electricity and the supply of electricity for the purpose. Such a scheme could only be undertaken if the necessary capital could be raised here.

At the meeting of debenture stockholders sanction was given to a modification of their rights, *i.e.*, the limiting of the payment of interest during the next one to three years to the extent allowed by the actual profits of the company and its cash resources in this country.

Benham & Sons, Ltd., held their annual meeting on December 19th, when Mr. S. J. Benham (managing director), who presided, in the course of his speech, said they were able to show a fair profit, a substantial portion of which, however, was due to the large amounts realised by the sale of shares on the Stock Exchange. The orders taken during the last quarter of 1931 showed a very serious shrinkage, but each quarter since had shown a progressive improvement, and their orders for October and November this year were 50 per cent. above those of last year. During the year new branch offices had been opened at Edinburgh, Dublin, Bournemouth, and Brighton. Their cooking apparatus department had been busy for some months, and the outlook for the works was much better than it was a year ago. Mr. Benham then mentioned some of the large kitchens which the company had fitted up in business houses and institutions in various parts of the country.

Tube Investments, Ltd., held its annual meeting on December 14th, when Mr. A. Chamberlain (chairman), who presided, in the course of his speech said that the decrease in the turnover with its concurrent diminution of profit margin could undoubtedly be attributed to the trade slump. Referring to their electrical accessories business, he said that the increased consumption of electricity that must follow the completion of the grid would be large, and manufacturers of electrical accessories who offered the public good value for money should be assured of a long and useful existence. Mr. Chamberlain then referred to the formation of the Simplex Electric Co., Ltd. (ELEC. REV., October 28th, p. 643), and said that by the re-arrangement of manufacture within the electrical group, and the co-ordination of selling efforts, they expected to effect considerable improvements and economies which, passed on to their customers, should increase the importance to them of this branch of their business, and play its part in the general improvement which they were satisfied was possible of attainment.

Adelaide Electric Supply Co., Ltd.—For the year ended August 31st the net revenue was £460,364, as compared with £488,811 in the previous year. The gross revenue was £750,136, against £747,826. Operating expenses increased by 3 per cent., and the net revenue was 2.5 per cent. less. After providing for interest and sinking funds there was a balance of £342,111, from which the directors have transferred £90,380 to general reserves and £40,000 to suspense account. After paying dividends on preference shares and 8½ per cent. on ordinary shares, there was a deficiency of £3,269, reducing the amount of undivided profits carried forward to £31,153.

International Telephone & Telegraph Corporation.—Particulars of the agreement for the settlement of the claims of the International Telephone and Telegraph Corporation on Kreuger and Toll were announced on December 16th, according to the financial papers. Under the settlement the I.T.T. acquires title to 610,000 shares in the L. M. Ericsson & Co., of Sweden. As a consequence of this agreement I.T.T. have no further interest in, or relations with, Kreuger and Toll. Arrangements have been made for the representation of the I.T.T. in the directorate of Ericsson & Co. of Sweden.

The Victoria Falls & Transvaal Power Co. has declared a dividend of 3 per cent. for the half-year ending December 31st and a further dividend of 3 per cent. in respect of the participating rights for the year on the preference shares, and an interim dividend of 3 per cent. in respect of 1932 on the ordinary shares. These payments are at the same rate as last year.

Turner & Newall, Ltd., report a profit for the year ended September 30th last of £423,820, as compared with £530,037 in the preceding year. After providing for depreciation, taxation, &c., and adding £34,840 brought in, there is a balance of £340,511 available. It is proposed to pay a final ordinary dividend of 2½ per cent., making 3½ per cent. for the year (against 5 per cent.), and to carry forward £52,766.

Buenos Ayres Lacroze Tramways Co. reports gross receipts of $5,618,056 for the year ended June 30th last, as against $6,398,925 in the preceding year. Working expenses totalled $5,361,171 ($5,292,653), leaving an operating surplus of $256,885. Debenture interest absorbed $684,216, difference in exchange and interests and discounts amounted to $931,766, renewals $285,378, and amortisations and sundries $509,523, increasing the deficit to be carried forward to $3,400,879.

The Cia. Hispano-Americana de Electricidad ("Chade"), is to pay interim dividends at the rate of 4 per cent. or 20 gold pesetas upon the series "A," "B" and "C" shares, and 4 gold pesetas on the series "D" and "E" shares. Last year's interim dividends were 6 per cent., or 30 gold pesetas, and 6 gold pesetas respectively.

Sheffield Steel Products, Ltd., reports a profit for the year ended May 31st last of £5,027, as compared with £29,627 in the preceding year. The balance at profit and loss account is £1,389, which with £11,736 brought in makes £13,125. After deducting debenture interest, &c., a debit balance of £15,957 is carried forward.

The Barbados Electric Supply Co., Ltd., reports a profit for the year ended June 30th of £10,927, including £3,569 brought in. General reserve receives £3,500, and a dividend of 6 per cent., tax free, is paid (against 7 per cent.), leaving £3,827 to be carried forward.

Stewarts & Lloyds of South Africa, Ltd., report a profit for the year to June 30th last of £54,464, against £58,228 in the preceding year. A sum of £20,171 has been set aside for depreciation, and after adding £2,625 brought in, and allowing £35,500 for preference dividends, a balance of £1,418 is carried forward.

Radiovisor Parent, Ltd., reports a loss for the seven months to March 31st last of £8,353, after meeting all charges and expenses, including depreciation (other than the cost of the High Court action, which at this date amounted to £2,134), making the total debit now £52,013.

Greenwood & Batley, Ltd., have announced an interim preference dividend of 3½ per cent. The directors state that the results show an improvement over those of last year, but they are deferring consideration of a dividend on the ordinary shares until the full results for the year are available.

The Midland Counties Electric Supply Co.—The subscription list for the issue of £700,000 four per cent. debenture stock at par which was opened on December 14th was closed on the same morning, the issue being heavily over-subscribed.

Marconi's Wireless Telegraph Co., Ltd., has announced that the dividend on the 7 per cent. cumulative participating preference shares in respect of the year ending December 31st, 1932, will be paid on January 2nd.

W. & T. Avery, Ltd., have announced an interim dividend of 5 per cent., less tax, at 4s. 6d. (same).

Allen West & Co., Ltd., whose report for 1931-32 was reviewed in our last issue (page 909), held their annual meeting on Tuesday last.

Stocks and Shares

TUESDAY EVENING.

IN the ordinary course of events, the price of money tends to become harder on the eve of a New Year, by reason of the seasonal demand for cash and the predilection of most people for making as good a show with their bank balance as is possible on December 31st. To these usual factors there is added, this year, a slight increase in the volume of capital required for trade purposes. Reports from various industrial centres in the North, in the Midlands, in Wales, indicate a stirring of the various branches of trade connected with these areas. These developments, although at present little more than an indication, are regarded as a hopeful pointer to what may be expected from business in the New Year. A little selling of gilt-edged stocks had the effect of dimming, last week-end, the recent brightness of safety-first issues. But aggressive buying, on the Tuesday in this week, of safety

first securities, turned the gilt-edged market into cheerfulness again, and the previous losses were all recovered.

Home Electricity Supply

There are no changes of consequence in the prices of the London companies' shares. The latter remain upon a basis of yield which averages £4 3s. 9d. per cent. Westminster ordinary and South London ordinary stand at 33s., City of London at 34s., the rest of the list at 33s. 6d. In the provincial group, North Eastern ordinary have strengthened 1s. to 28s., and the 7 per cent. preference to 31s. 6d. Northamptons are 9d. harder at 48s. 9d. The offer of North Metropolitan 6 per cent. preference at 28s. 3d., free of stamp and fee, found a ready demand, and the bulk of the block which recently came on to market has now been placed.

Traction Stocks

Metropolitan Railway consolidated stock remains the most popular, from the speculative point of view; the price was advanced from 59 to 61. Districts are unchanged at 62½, failing to rally from their 3 point fall of a week ago. The positions of the District Railway and of the Metropolitan are anything but similar. Those who favour the latter company are strong in their contention that there should be a difference of some 15 points between the two stocks, Metropolitans standing the higher of the pair.

Underground Electrics are unchanged at 18s. The company's 5 per cent. mortgage debenture is 1 better at 105½.

London & Suburban Traction preference have receded to 11s. 6d., but there has been a little demand for the ordinary, raising the price of the latter to 1s. 3d. The company's 4½ per cent. first mortgage debenture stock, and the 5 per cent. "A" debenture stock, both stand at about 97½. London United Tramways 4 per cent. debenture is marked ex dividend this week. The foreign division shows mixed changes. Brazilian Tractions rose 1⅛ to 12⅞; Argentine Tramways first preference have been marked down to 3s. 3d.; shares changed hands a few days ago at 2s. 3d.

Manufacturing and Equipment

Brush Electrical ordinary stock has fallen 5 points to 35, and business was recently marked as low as 30. The company has paid no dividend on the ordinary stock since May, 1931. The price of the 4½ per cent. perpetual first debenture is quoted at 74, and the 4½ per cent. second debenture at 60. Callender's ordinary strengthened to 3½, and Siemens ordinary are 6d. better at 25s. Ever Ready shares improved to 26s. 9d. British Aluminiums are 9d. easier at 23s. 9d. Telegraph Construction, in their new £1 shape, are changing hands on the basis of 16s. The rearrangement of the capital account is failing to galvanise any fresh interest in the shares, and the return of £7 per share to the proprietors does not seem to have been spent, up to the present, in the purchase of the new £1 shares of the company. Telephone Manufacturing shares eased off to 4s. 4½d. India Rubber shares have fallen to the nominal price of half a crown.

Babcock & Wilcox strengthened to 38s. 9d., Vickers to 7s., and other shares in companies connected with the iron, coal, steel and allied trades are presenting a firmer front. For this, the trade returns received from various parts of the country are, in the main, responsible. It would seem as though trade and industry were slowly getting on to their feet. There has been a fairly widespread demand for shares in the companies just mentioned, although other industrials are being treated with indifference.

Cables and Wireless

The 5½ per cent. preference, and the 7½ per cent. "A" ordinary stocks, of Cables & Wireless, show declines of a point apiece, at 77½ and 27 respectively. For this dullness the inactivity noticeable on the eve of Christmas is sufficient explanation. Globe Telegraph ordinary at 10¾, and the preference at 11, are both ex dividend, and, allowing for the deductions, show declines in the prices. A point improvement in Anglo-American Telegraph preferred stock raised the price to 106½, the deferred remaining at 26. No changes of importance have occurred in other stocks in this group.

Dollar Stocks

The trend of Canadian, American, and other dollar stocks has been upward. New York is putting a better face upon its troubles, for the buying which has brought about the improvement in prices has its origin in Wall Street. The American Treasury is faced with the certainty of a huge deficit at the end of the financial year. The revenue of New York City is far behind its normal amount. Income tax collection from United States citizens is not much more than half what it was at this time last year in respect of the period that has elapsed. President Hoover has laid great stress upon the difference between the banking systems of his own country and Great Britain, pointing out that not a single failure has occurred in this country, as compared with the 4,300 in America during the past three years. These bank failures not only reflect the condition of trade, but have a disastrous influence over the recovery of business.

Amongst the higher priced shares, American Telephone and Telegraph hold their gain of last week at 165½. In the lower-priced group, International Telephones have gone back to 11, a fall of 2 points. Power Corporation of Canada are quoted at the same figure, Consolidated Gas & Electric of Baltimore at 96, and Shawinigan at 13s.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Dec. 20.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/6	—	4 4 9
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb.	Stock	4½	4½	104	—	4 5 9
Charing Cross Ordinary	1	8½	8½	33/6	—	4 3 7
Chelsea	1	8⅞	8⅞	33/6	—	4 3 7
City of London	1	10	10	34/-xr.	—	4 2 4
Clyde Valley	1	8	7	32/-	—	4 7 9
County of London	1	11	10½	50/-	—	4 4 0
Edmundsons' 7% Pref.	1	7	7	30/-	—	4 13 4
Elec. Dis. Yorkshire	1	9	9	41/3	—	4 7 4
Elec. Supply Corporation	1	11	11	55/-	—	4 0 0
Kensington Ordinary	1	8	8	33/6	—	4 3 7
Lancs. Light and Power	1	6½	7	29/3	—	4 15 9
London & Home Counties 4½% Deb.	Stock	4½	4½	107	—	4 4 0
London Electric	1	9	9	33/6	—	4 3 0
Metropolitan	1	10	10	46/3	+3d.	4 6 6
Midland Counties	1	7	7	33/3	—	4 4 2
Mid. Elec. Power	1	8	8	34/6	—	4 12 9
North Eastern Electric Ordinary	1	6	6	28/-	+1/-	4 5 9
Do. 7% Pref.	1	7	7	31/6	+6d.	4 9 0
Northampton	1	10	10	48/9	+9d.	4 2 0
Notting Hill 6% Pref.	10	6	6	12½xd	+½	4 14 0
North Met. Elec. 6% Pref.	1	6	6	29/-	—	4 2 9
St. James' and Pall Mall	1	8	8	33/6	—	4 3 7
Scottish Power	1	8	8	33/9	—	4 14 10
South London	1	8½	8½	33/-	—	4 4 10
Urban Ordinary	1	7	7	33/9	—	4 3 3
Westminster Ordinary	1	8½	8½	33/-	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	39/-	—	4 2 0
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	„	3½	2½	61	+2	4 2 0
Do. District	„	5	4½	62½	—5	7 4 0
Underground Electric	1	8	7	18/-	—	7 15 7
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	165½	—	5 8 10
Anglo-Am. Tel. Pref.	Stock	6	6	106½	+1	5 12 9
Do. Def.	„	1½	1½	26	—	5 15 5
Cables & Wireless 5½% Pref.	„	5½	2⅜	77½	—1	3 11 0
Do. A 7½% Ord.	„	—	Nil	27	—1	—
Do. B Ord.	„	—	Nil	12	—	—
Globe Tel. and T. Ord.	10	8½	Nil	10¾xd	—9/-	—
Do. do. Pref.	10	6	6	11xd	—2/-	5 9 1
Great Northern Tel.	10	20	20	27½	—	7 5 6
Marconi-Marine	1	15	10	32/-	—	6 5 0
Oriental Telephone Ord.	1	12	12	2⅛	—	*4 1 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/3	—⅛	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	
British Electric Traction Def. Ord.	„	5	5	265	—10	—
Do. do. Pref. Ord.	„	8	8	132½	—	6 0 9
Brazil Traction	100	—	—	12⅞	+1½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	101½	—	4 18 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	11/6	—6d.	—
London United Tram Deb.	Stock	4	4	65½xd	—	6 2 2
Mexico Trams, 5% Bonds	—	5	5	45	—	11 2 2
Mexican Light Common	100	Nil	Nil	10	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	72½	—	6 18 0
Victoria Falls Ord.	1	15	15	77/6	—	3 17 4
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	17/6	—	4 11 5
Do. Pref.	1	8	8	30/-	—	5 6 8
Babcock & Wilcox	1	14	14	38/9	+6d.	—
British Aluminium Ord.	1	10	5	23/9	—9d.	4 4 0
British Insulated Ord.	1	15	15	65/-	—	4 12 4
Brush Ord.	Stock	5	Nil	35	—5	—
Callender's	1	15	15	3½	+⅛	4 16 0
Do. 6½% Pref.	1	6½	6½	28/3xd	—	4 12 0
Crompton Parkinson Ord.	5/-	30	24	20/9xd	—	5 8 6
Do. 8% Pref.	1	8	8	30/-	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	100xd	+2	5 0 0
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	4⅞	—	5 12 7
English Electric	1	Nil	Nil	9/6	—	—
Do. do. Pref.	1	Nil	Nil	13/9	—3d.	—
Ever Ready	5/-	35	35	27/-	+6d.	6 9 8
Ferranti Pref.	1	7	7	24/-	+6d.	5 16 8
G.E.C. Pref.	1	6½	6½	29/-	—	4 9 8
Do. ord.	1	10	8	39/6	—	4 2 0
Henley's	1	30	30	6⅛	—	4 19 0
Do. 4½ Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—⅛	—
Johnson & Phillips	1	10	5	1	—	5 0 0
Siemens Ord.	1	7½	7½	25/-	+6d.	6 0 0
Telegraph Construction	£1	Nil	Nil	16/3	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

14435. "Radio tuning control." C. M. Tichenor. June 18th, 1931. (383954.)
14513. "Electrical switch-sockets and fuses." J. A. Crabtree and B. G. Harrison. May 16th, 1931. (383955.)
14842. "Sparking plugs." J. Weller. May 20th, 1931. (383960.)
14888. "Vapour-electric apparatus." British Thomson-Houston Co., Ltd. May 20th, 1930. (383961.)
15924. "Distant control of electric circuits." A. E. Jones. June 1st, 1931. (383966.)
16215. "Electrical step-by-step transmitter and receiver motor systems." Barr & Stroud, Ltd., and J. W. French. June 4th, 1931. (383969.)
16480. "Protective arrangements for electric transmission lines." British Thomson-Houston Co., Ltd. June 5th, 1930. (Patent of addition not granted.) (383971.)
16483. "Electric protective arrangements." British Thomson-Houston Co., Ltd. June 5th, 1930. (383972.)
21242. "Thermionic valve oscillators." Wired Radio Inc. April 22nd, 1931. (383981.)
22882. "Electrical plug connection." Belling & Lee, Ltd., and S. Cairns. August 13th, 1931. (383982.)
23692. "Remote operation of electric sub-stations." B. Thomas and E. Thomas. August 24th, 1931. (383985.)
23764. "Sound-reproducing systems." J. H. Hammond, Jun. August 23rd, 1930. (383986.)
23882. "Electric coupling-circuits for thermionic valve circuits." Hazeltine Corporation. September 25th, 1930. (383987.)
24446. "X-ray diagnostic tables." British Thomson-Houston Co., Ltd. August 30th, 1930. (383994.)
25397. "Method and means for the electromagnetic control of the fuel-injection valves of internal combustion engines." B. Walker and H. E. Kennedy. September 10th, 1930. (384002.)
25437. "Electromotors for the driving of screw fans." M. Adamcikas, G. Massera, and J. M. Stone. September 10th, 1931. (384003.)
25889. "Electric switches with arc extinction by self-generated vapour." Siemens-Schuckertwerke Akt.-Ges. September 18th, 1930. (384007.)
28201. "Automatic electric control devices for controlling the heat of incubators, rooms, and the like." Gloucester Incubator Co., Ltd., and G. W. Wrentmore. October 10th, 1931. (384025.)
28613. "Traffic-control signals." S. T. Quilliam and G. G. R. Harris. October 15th, 1931. (384029.)
29010. "Sparking plug." J. Reinthaler. October 19th, 1931. (384033.)
29140. "Electric retardation networks." Lignes Télégraphiques et Téléphoniques. December 18th, 1930. (384035.)
29573. "Electrically driven vehicles." Akt.-Ges. Brown, Boveri, et Cie. October 25th, 1930. (384041.)
31274. "Electric switches or circuit breakers." G. W. Davidson and Associated Electrical Industries, Ltd. November 11th, 1931. (384054.)
31363. "Magnetic systems of sound reproducing apparatus." W. Vollmann (trading as Grass & Worff). March 14th, 1931. (384055.)
32232. "Manufacture of thermionic electrodes for electric discharge tubes." General Electric Co., Ltd., and J. T. Randall. November 20th, 1931. (384057.)
32375. "Variable electrical condensers." A. Shackell. November 23rd, 1931. (384069.)
33697. "Vacuum tube for television, the transmission of moving pictures, and the like applications." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. December 4th, 1930. (384086.)
34272. "Apparatus for heating gases by electricity." E. Cignolo. January 26th, 1931. (384090.)
34714. "Apparatus for registering the flow of gas or electricity." D. O. Bremner. June 1st, 1931. (Divided application on 15955/31.) (384093.)
34898. "Television and like receivers and cathode-ray tubes for use therein." Marconi's Wireless Telegraph Co., Ltd. December 24th, 1930. (384094.)
35245. "Variable electric condensers." B. Hesketh. December 21st, 1931. (384096.)
35416. "Electron-emitting cathode heated by an auxiliary glow-discharge." J. Kremenezky (trading as J. Kremenezky a firm), C. Schonbauer, and P. Von Kalocsay. December 24th, 1930. (384099.)
35617. "Electric safety switch devices." Telefunken Ges. für Drahtlose Telegraphie. December 23rd, 1930. (384101.)

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943. "Electric pick-ups for gramophones and the like." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. January 31st, 1931. (384107.)
1348. "Variable electrical condensers." Plessey Co., Ltd., and W. O. Heyne, and P. J. Packman. January 16th, 1932. (Addition to 374617.) (384113.)
2068. "Oil switches." British Thomson-Houston Co., Ltd January 22nd, 1931. (384116.)
2520. "Electric discharge devices." British Thomson-Houston Co., Ltd. January 31st, 1931. (384119.)
3870. "Radio-frequency distribution systems." Marconi's Wireless Telegraph Co., Ltd. February 25th, 1931. (384121.)
3999. "Sockets for vacuum tubes." British Thomson-Houston Co., Ltd. January 30th, 1931. (384123.)
3592. "Electric clocks." Stockall, Marples & Co., Ltd., and J. J. Stockall. February 6th, 1932. (384128.)
3633. "Internal combustion engine electric vehicles." Sulzer Freres Soc. Anon. March 6th, 1931. (384129.)
4714. "Devices for controlling the sound intensity in low-frequency distribution systems and like purposes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 24th, 1931. (384134.)
4751. "Thermionic valves or electron-discharge tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. May 1st, 1931. (384136.)
5684. "X-ray apparatus." British Thomson-Houston Co., Ltd. February 28th, 1931. (384141.)
6563. "Electric heating pads." British Thomson-Houston Co., Ltd. March 6th, 1931. (384146.)
10178. "Arrangements for the rectification of modulated high-frequency oscillations." D. A. Bell. April 9th, 1932. (384167.)
12624. "Radio and other carrier-wave receivers." Siemens & Halske Akt.-Ges. May 2nd, 1931. (384178.)
14963. "Motor train for operating switches." Landis & Gyr Akt.-Ges. June 5th, 1931. (Patent of addition not granted.) (384194.)
16074. "Electrode systems for electrolytic condensers and rectifiers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 26th, 1931. (384203.)
16418. "Electrical television apparatus." Compagnie Générale de Television (H. de Procedes, France). June 13th, 1931. (384207.)
21479. "Electric control systems for alternating-current circuits." British Thomson-Houston Co., Ltd. July 29th, 1931. (384246.)
22424. "Electric regulators." British Thomson-Houston Co., Ltd. August 10th, 1931. (384249.)
23830. "Electric fuses." International General Electric Co., Inc. August 25th, 1931. (384252.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from December 14th :—

Refaco. No. 527506. Class 8. Electrically illuminated advertising signs.—L. A. Ramsden, J. Morgan and H. Ford, trading in co-partnership, Empire Works, Oldham Road, Failsworth, Manchester.

Cunningham (lettering and design). No. 529689. Class 8. Thermionic valves and gaseous glow discharge tubes.—E. T. Cunningham, New York, U.S.A. (British representative : C. Locket Hughes, 46, Bedford Row, W.C.1.).

Marconivisor. No. 534900. Class 8. Television apparatus, and apparatus employing telegraphy or wireless telegraphy for transmitting and recording scenes, pictures, maps, diagrams, script, print, and the like at a distance.—Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, W.C.2.

Lewcosite. No. 535020. Class 8. Electric light flexibles and telephone flexibles, composed of two or more wires insulated with india-rubber with an outer covering of textile material; cables for electrical purposes, electric coils and apparatus for use in connection with radio-telephony and telegraphy. Lewbestos. No. 536498. Class 50. Tape made of asbestos or in which asbestos predominates.—London Electric Wire Co. and Smiths, Ltd., 7, Playhouse Yard, Golden Lane, E.C.2.

Bulgin. No. 535398. Class 8. Component parts of radio-telephonic and telegraphic apparatus.—A. F. Bulgin & Co., Ltd., Abbey Road, Barking, Essex.

Illuminex. No. 535857. Class 8. Internally illuminated advertising signs.—Henry W. Jenny, trading as the British & Continental Advertising Service, Dudley House, Southampton Street, W.C.2.

Lissen. No. 536320. Class 8. Radio-gramophones and parts thereof, &c.—Lissen, Ltd., Worple Road, Isleworth, Middlesex.

Direlco. No. 535992. Class 13. Electric lamps (ordinary).—H. Goldberg, trading as the Direct Lamp and Electrical Supplies, 84, Hanover Street, Manchester.

An Electro-magnetic Servo Brake

THE most outstanding advantage of the Pagefield electro-magnetic servo brake, marketed by Pagefield Commercial Vehicles, Ltd., Wigan, is that the pressure applied increases as the speed decreases.

The device, which does not in any way interfere with the manual operation of the brakes, has only one moving part, a light steel disc driven off the transmission of the vehicle, and therefore rotating when the brakes are "off." This disc is fitted in between an annular electro-magnet and a disc type armature plate, both being fitted with friction material. When the magnet is energised by the driver the armature plate is attracted and the spring plate connected to the transmission is gripped between the magnet and the armature plate. This tends to carry with it the magnet, on which is a cam bearing against a roller-ended lever which operates the brake mechanism.

As the steel disc is always running past the pole faces of the annular magnet when the latter is energised, short-circuit currents are set up in it, and these tend to set up a contra field which, to a certain extent, counterbalances the energising field. The strength of this back field is proportionate to the current flowing and the latter, of course, follows the usual I^2R law, so that the back field itself is inversely proportional to the square of the moving part, and hence to the square of the speed of the vehicle.

The operation can be controlled by a switch and resistance on the steering wheel, and there is a pilot lamp on the dashboard in series with the magnet. During the application of the brake the current taken is 2A, and this comes from the car's starting and lighting battery.

Tests of this brake were made recently by our contemporary, *Motor Transport*, and it was found that with a saloon car with brakes of comparatively low efficiency, for stopping from 30 m.p.h. took 9⅝ secs. with foot operation alone, 6¼ secs. with the Pagefield servo, and 4⅝ secs with both simultaneously.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham (CHESHIRE).—Houses (100); U.D.C. surveyor.

Andover (HANTS).—Municipal offices and shops (£5,000); borough surveyor.

Ashford.—School, Knapp Road (£10,741); Fassnidge & Son, Ltd., Uxbridge.

Ayr.—Houses (72), Lochside (electrical work); W. Cowie, architect, 5, Wellington Square.

Becontree.—Cinema and shops; Heathway; A. Kay, of Grange & Regent Cinemas.

Bedford.—Houses, Elstow Road; E. H. C. Inskip, architect and surveyor, 31, Goldington Road. Houses, Warwick Road; Warton & Goodship, builders, 8, Union Street. Bakery premises, 4, Hassett Street, for G. Hopper & Son, 39, Midland Road.

Birkenhead.—Secondary school, Manor Hill, for Catholic Authorities (electric lighting installations); W. Ellis, Union Bank Chambers, Hardshaw Street, St. Helen's.

Birmingham.—Congregational church and schools; Rev. J. B. Petts, 70, Park Road, Sparkhill.

Blackpool.—Hotel, North Shore (£1,000,000), with electrical work and 25 electric lifts; H. W. Matthews, architect, Bath.

Blandford.—R.C. church; Rev. H. O'Brien, The Old House, Poole Road.

Brighton.—Houses (28), Bevendean Estate; Braybons, Ltd. Church, Elm Grove and Whippingham Road; St. Wildred's Church Council. Catholic church, Whitehawk Valley; Rev. J. Newton. Seven shops, Whitehawk Road; F. J. Wellman.

Bristol.—Abattoir, Greenback site (£30,000); city engineer. Seven shops, Bedminster Road; R. Cook.

Carlisle.—Houses (21), Dale Street; S. W. B. Jack. Houses (30), Upperby; city engineer.

Cheadle and Gatley.—Public library, Mellor Street; J. Wrest, surveyor, Council Offices, High Street.

Cheam.—Houses, near Church Hill; Tamworth Park Construction Co., Ltd., 54, Tamworth Park, Mitcham. Development of Quarry Estate; E. J. Peacock, 46, Queen's Road, S.W.8.

Cheltenham.—Rebuilding business stores, The Promenade, for Chanelle, Ltd.

Cheshire.—Schools, Ellesmere Port (£25,470), Kelsall (£7,064), Runcorn (£2,500), and Sale (£7,259); F. F. Potter, director of education, Chester. Houses (20); R. B. Keane, architect, Westminster Bank Chambers. Two greyhound tracks, Sealand Road; Provincial Greyhound Syndicate, Ltd., and J. R. Hurrell. Totalisator, Raceccurse; Chester Race Co., Ltd.

Chesterfield.—Central emporium for the Co-operative Society; W. Dunks, secretary. Houses (58); W. Memmory, builder, Sheffield.

Congleton.—Houses (50); borough surveyor.

Dagenham (ESSEX).—Housing scheme; U.D.C. surveyor.

Darlington.—Additions to the Girls' High School; E. Minors, borough engineer.

Dartford.—Houses (142), Hallford Village; W. J. Brise.

Dodworth (YORKS).—Houses (26), Barnsley Road; J. Stottard, builder, Pontefract Road, Cudworth.

Douglas (I.O.M.).—Alterations to Central Hotel, Broadway, and Railway Hotel, The Bridge; Maningtons, Ltd.

Eastbourne.—Development of Crumbles site; Chatsworth Estate Co.

Edinburgh.—Houses (21), Belford Avenue; C. McKendrick, builder. Houses (27), Craiglockhart Gardens; J. Miller, builder.

Ellesmere Port (CHESHIRE).—Extensions, Mersey Paper Mills (£850,000), for W. V. Bowater & Sons, Ltd.; K. Linforth, general manager.

Emsworth (HANTS).—Houses (78), Broadbridge, for Mr. Keeping; J. R. C. Miller, 2, Portland Place, Kent Road, Portsmouth.

Exeter.—Houses (306), Wonford; city architect.

Gateshead.—Extension to mental hospital; borough engineer.

Glasgow.—Houses, Caroline Street, Edgefauld Road, &c.; architect, Housing Department.

Golborne (LANCS).—Houses (24), Charles Street, for Kearsley & Gee.

Halifax.—Shops, &c., King Cross Street (electrical work); D. T. Lloyd Jones, borough engineer. Extensions, Ambler Thorn Fireclay Works; G. R. Oddy, architect, Ward's End Chambers.

Halstead (ESSEX).—Houses (52); U.D.C. surveyor.

Hampshire.—Motor car factory for C. S. Barrow, Lymington, and G. H. Jones, Birmingham.

Harrogate.—R.C. school, Bilton, for E.C.

Hemsworth.—Houses (100) and waterworks (£38,500); R.D.C. surveyor.

Hoole.—(CHESHIRE).—Houses (25), Canadian Avenue; Amos, Ltd.

Hyde.—Houses (38), Back Bower (£12,500); R. B. Key, Bredbury. Transformer house, Throstle Bank Mill; Ashton Bros. & Co., Ltd.

Irish Free State.—(DUBLIN).—Houses (59), Bath Avenue area; Corporation housing architect, Exchange Buildings, Lord Edward Street. (GALWAY).—Reconstruction of waterworks (£15,000); Wm. N. Binns, engineer, Council Offices. (SLIGO).—Houses (52), Abbeyquarter housing area; McDonnell, Dixon & Downes, architects, 20, Ely Place, Dublin.

Kidderminster.—Houses (22), Lyndholm Estate, for J. T. Biggs.

Kilmarnock.—Creamery (£28,000), for the Scottish Co-operative Wholesale Society, Ltd., Morrison Street, Glasgow.

Leeds.—Houses, Westfield (138), Potternewton (150), and York Road (66); J. E. Acfield, city engineer.

Leicester.—Church, St. Anne's, Western Park; W. Haddon & Son, builders, Gladstone Street.

Lincoln.—Houses (80), Simon's Hill, and 40, Swift Gardens; city surveyor.

Liverpool.—Houses, Bellefield Road (42), Eaton Road (47), Sandforth Road (25), and Sandfield Road (25); Tyson's (Contractors), Ltd., builders, Dryden Street. Garage, Edge Grove, Edge Lane, for Sumner Engineering Co., Ltd. H. C. Killender, architects, 62, Dale Street. Extensions, factory premises, 1, Chapel Gardens, for B. Kershaw & Co., Ltd. A. J. Howcroft & Son, architects, Priory Buildings, Union Street, Oldham.

London.—(COVENT GARDEN).—Reconstruction of Opera House; Hood & Hughes. (DEPTFORD).—Flats, Rokeby Road; Wallen & Clunn, 82, Queen Street, E.C.2. (DULWICH).—Tenements, East Dulwich Estate (£31,300), for L.C.C.; Gee, Walker & Slater, Ltd. (EAST HAM).—Houses and flats (£28,626); borough engineer. (E.C.).—Medical college extensions, Charterhouse Square; St. Bart's Hospital, governors. Modernisation of City Temple; Dr. F. W. Norwood. Rebuilding of bank, Birchin Lane; Wm. Deacon's Bank, Ltd. (BOW).—Tenements, Bow Bridge Estate (£27,000), for L.C.C.; Rowley Bros., Ltd. (GREENWICH).—Houses, Weyman Road and Merriman Road; H. Ainslie, Kidbrook Park Estates, Ltd. (HAMMERSMITH).—Tenements, Wormholt Estate (£38,740); L.C.C. architect. (ISLINGTON).—Flats (70), Crough Hill; borough engineer. (WESTMINSTER).—Buildings, Millbank Estate; Associated London Properties, Ltd., St. Ermin's, Caxton Street, S.W.1. (WOOLWICH).—Works depôt, Eltham (£11,000); borough engineer.

Macclesfield.—Houses (120), Moss Lane Estate; E. Hamson, borough surveyor.

Maidstone.—Cinema, Stone Street, for Bernstein Theatres, Ltd., 197, Wardour Street, London, W.

Mansfield.—New wing, Harlow Wood Orthopædic Hospital (£14,000); Bromley, Cartwright & Waumsley, architect, Nottingham.

Middlesex.—Secondary school, Potters Bar, for County E.C. Extensions, Park School, Pinner (£11,362); H. Neal, Ltd., Northwood.

Newburn-on-Tyne.—Houses (394) (£154,000); J. H. Weatherley, surveyor, Council Offices.

Newbury.—Shops and offices, Northbrook Street; W. Free & Sons, builders, 18, High Street, Marlborough.

Newcastle-under-Lyme.—Houses (114), Poolfield Estate (electric lighting installations); Fletcher & Sons, builders, 29, High Town, Crewe.

Newport (I.O.W.).—Houses (20), Barton Estate and School Lane; borough engineer.

Oldham.—Housing scheme, Abbey Hills Road (£148,430); borough surveyor.

Old Wigston (LEICESTER).—Re-erection of two factories for Foulton & Son (£20,000).

Parkstone (DORSET).—Extensions, Russell-Cotes Nautical School (£10,000); Commander A. Pettman, superintendent.

Patcham (SUSSEX).—Houses (80), Barrhill Avenue, &c.; G. Furguson & Son.

Ramsgate.—Houses (20), Nethercourt Hill, for Dorman & Co.; W. E. Healey, architect, Grange Road.

Rosyth (FIFESHIRE).—Methodist church; the minister.

Rotherham.—Site development, Effingham Street and Howard Street; Sterling Estates, Ltd.

Rugby.—Houses, Benns Farm Estate; W. H. Adams & Son, builders, 35a, Regent Street.

Sandwich.—Housing scheme; borough surveyor.

Scarborough.—Maternity block, Scalby Road (£10,000), and conversion of premises to education offices and employment bureau; borough engineer. Additions to Belle Vue Hotel, Westborough; A. Brumby.

Seaforth (NEAR LIVERPOOL).—Greyhound racing track; Medcalf & Medcalf, Stanley Street, Liverpool.

Slough.—Reconstruction, business premises, Grove Parade, for Bennett & Son.

Southall.—Houses (62), Waxlow Estate; G. Wimpey & Co., Ltd.

Stafford.—Houses (34), Tixall Road, for H. S. Edwards. Bazaar stores, Goalgate, for Marks & Spencer, Ltd., London.

Stockport.—Houses (92) and 20 block of flats; Unit Construction Co., Ltd., builders, Liverpool.

Stockton-on-Tees.—Houses (162), Sunderland Glebe Estate; G. P. Stainsby, architect, 25, High Street.

Stratford-on-Avon.—Houses (26); R.D.C. surveyor.

Surrey.—School, Carshalton (£25,797); Ashford Builders Co., Ltd.

Sutton Coldfield.—Buildings, Holland Road; Birmingham & Midland Bus Co.

Swindon.—Store and ten garages, Drove Road; Swindon Transport Co.

Tamworth.—Additions to central premises; Building Dept., Tamworth Industrial Co-operative Society.

Torquay.—Telephone exchange; Parsons & Morris, Ltd., builders, 133, Belgrave Road, Birmingham.

Troon (CORNWALL).—Hall, &c. (£7,700), Troon Old Church; Rev. R. Smith.

Tynemouth.—Houses, North Chirton Estate (22), and Lynn Road (17); F. R. N. Haswell & Son.

Uxbridge.—Houses (20), Newcrofts Road; W. S. Try, builders, Cowley.

Wakefield.—Cinema, Pincheon area, for the Associated British Cinemas, Ltd.; W. R. Glen, staff architect, Heddon Street, Regent Street, W.1.

West Sussex.—School, St. James Road, Chichester (£8,553); R. Drewitt & Son, Bournemouth. Extensions to High School for Girls, Chichester (£7,250), for County E.C.

Weybridge (SURREY).—Houses and shops; E. H. Thompson.

Widnes.—Houses (36); borough surveyor.

Wigan.—Houses (28), Woodhouse Lane, for the Wigan Greyhound Racing & Sports Club; secretary.

Wolverhampton.—Houses (50), Low Hill Estate (£14,300); A. M. Griffiths & Son, builders.

Worthing.—Hospital extensions; J. S. Snell, architect, Fairview, Durrington.